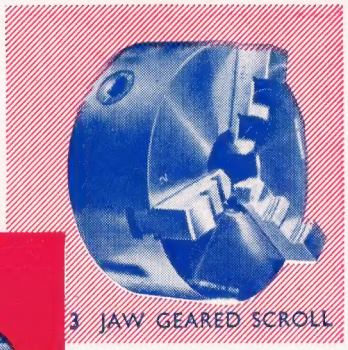
Model Engineer

THE MAGAZINE FOR THE MECHANICALLY MINDED

ONE SHILLING 5 DECEMBER 1957 VOL 117 NO 2950

BURNERD

PRECISION CHUCKS



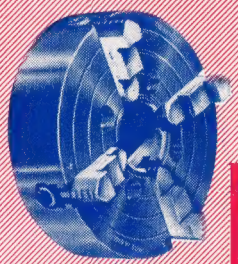
3 JAW GEARED SCROLL

3 JAW LEVER SCROLL

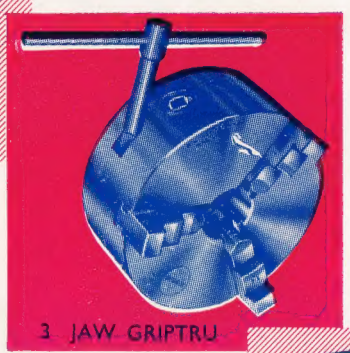
HIGH PRECISION INSTRUMENT MAKER'S CHUCK

THE UNANIMOUS CHOICE OF DISCRIMINATING MODEL ENGINEERS THROUGHOUT THE WORLD

SAFELY FIRST

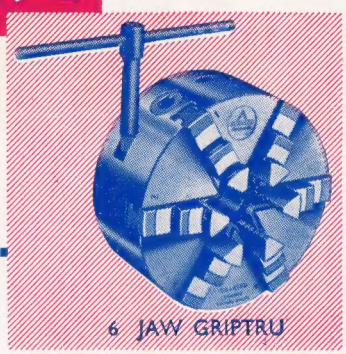


4 JAW INDEPENDENT



3 JAW GRIPTRU

Fit a "BURNERD" chuck to your lathe and obtain "exhibition" results every time. **IT COSTS NO MORE TO BUY THE BEST!** For those who desire really exceptional accuracy, "BURNERD" GRIPTRU Chucks are unequalled. Unique adjustment feature enables accuracy to be adjusted to within ·0002″ (two tenthousandths of an inch), total indicator reading. Direct Mounting types available for Myford ML7 lathes. No backplates required. Ask your Myford dealer for details.



6 JAW GRIPTRU

F. BURNERD & COMPANY, LTD.

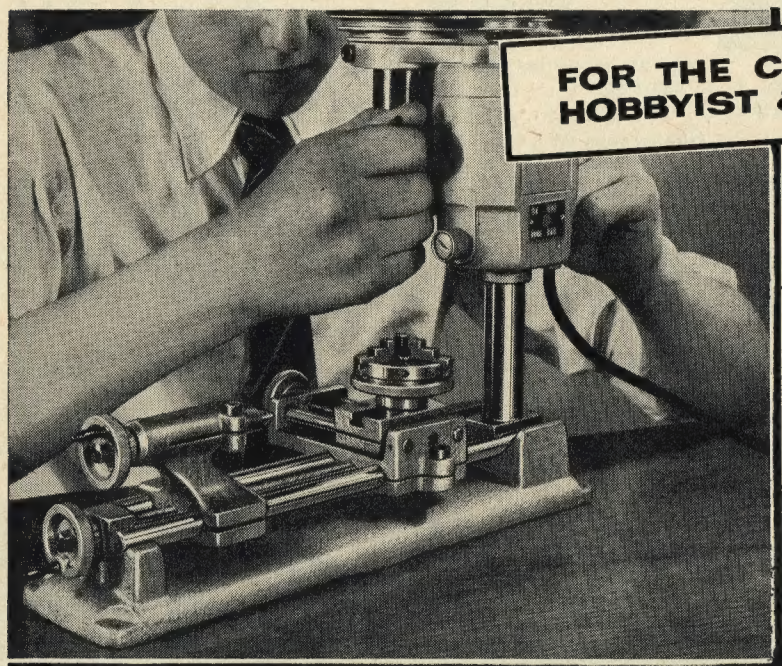
5 BALFOUR PLACE, PARK LANE, LONDON, W.1

Phone: GROsvenor 4741/3 Grams: BURCHUCKS-AUDLEY-LONDON

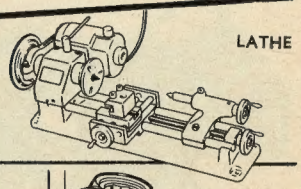
and NOW!

THE Selecta UNIMAT

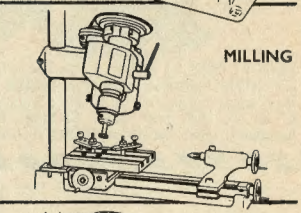
a self-powered multi-purpose machine shop



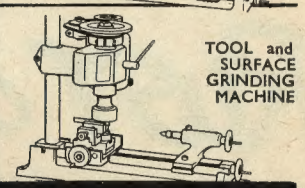
FOR THE CRAFTSMAN-HOBBYIST & INVENTOR



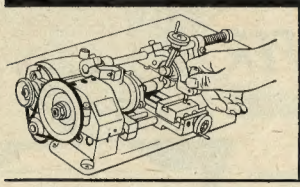
LATHE



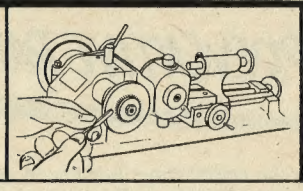
MILLING



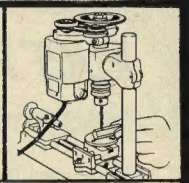
TOOL and SURFACE GRINDING MACHINE



THREADING ATTACHMENT



POLISHING and GRINDING



DRILLING

YOURS FOR ONLY

50/- DEPOSIT

8 MONTHLY PAYMENTS OF £3·4·6

RETAIL PRICE £24·17·6

Post Coupon NOW!

FOR ILLUSTRATED BROCHURE

No bigger than a typewriter, yet outperforms machines many times its size. This precision portable machine shop is universally acclaimed as the finest tool ever developed for machining small parts made of steel, brass, aluminium or plastic.

Because of its unique construction it can be simply converted from a Lathe into a Drillpress. Milling Machine, Tool Grinder Machine, Grinding and Polishing Machine, Jig-Saw, Circular Saw, Threading Machine, Dividing Machine and Portable Press.

Please send me Illustrated UNIMAT Brochure

Name.....

Address.....

.....

SELECTA POWER TOOLS LTD.

HAMPTON ROAD WEST, HANWORTH, FELTHAM, MIDDLESEX

(ME/N)

A completely new conception of

Hacksaw Design

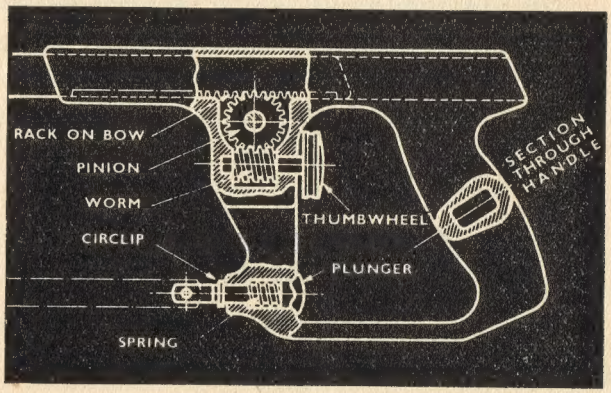
ELIMINATING THE FAILINGS OF EXISTING ORTHODOX DESIGNS.

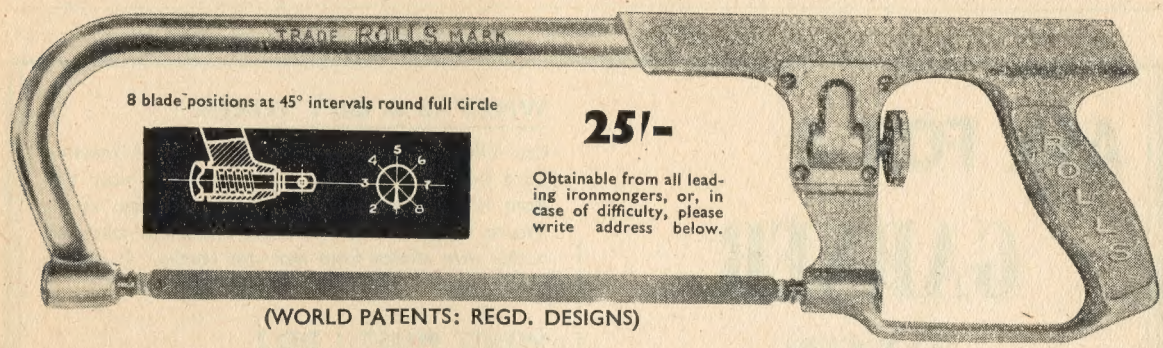
Alteration of blade angle is quick and simple. To adjust the angle of the blade slack off the thumbwheel and the spring-loaded plungers will free themselves, rotate the blade to the approximate position required, retighten the thumbwheel and the plungers automatically seat themselves in accurate alignment.

Blade changed in seconds. To change a blade simply slack off the thumbwheel until the blade becomes free. If required, continue to rotate the thumbwheel to adjust the frame for a different length of blade, drop the new blade into position on the retaining pins and tighten up the thumbwheel.

All adjustments controlled by a single thumbwheel. The outstanding feature of the Rolls Hacksaw is the single thumbwheel which controls all adjustments for tension, blade changing, angle of blade or alteration of length of blade.
Conveniently placed in the handguard, this thumbwheel has an integral worm driving a pinion which engages with a rack on the bow. This arrangement locks positively under tension and cannot be knocked loose in use, yet the thumbwheel runs freely on release of tension and provides infinitely variable adjustment for tension on all sizes of blade from 9" to 12".

Frame never falls to pieces. The bow is captive in the handle so that the frame never falls to pieces, and the spring-loaded plungers which carry the retaining pins are secured by circlips so that they are always in position ready to accept the new blade.





8 blade positions at 45° intervals round full circle

25/-

Obtainable from all leading ironmongers, or, in case of difficulty, please write address below.

(WORLD PATENTS: REGD. DESIGNS)

Always stays in one piece

FINEST MATERIALS

All parts of the finest quality materials, selected for suitability rather than price, to put the Rolls Hacksaw in a class of its own.

THE THUMBWHEEL worm and pinion are accurately machined. The totally-enclosed mechanism is dust and dirt proof for trouble-free operation, and requires no attention whatsoever.

THE BOW is of special light alloy, forged and heat treated for toughness. The stress-calculated section eliminates whip and overstrain. The rack is machine cut for accurate control and the wide throat permits full-depth cutting.

THE HANDLE is pressure die-cast in aluminium to a special pear-shaped pistol-grip design giving a comfortable sawing position for accuracy and minimum fatigue. Its distinctive hammered finish is non-greasy and easy to keep clean.

THE PLUNGERS are precision formed for accurate alignment.

ROLLS SCIENTIFICALLY DESIGNED SUPER HACKSAW

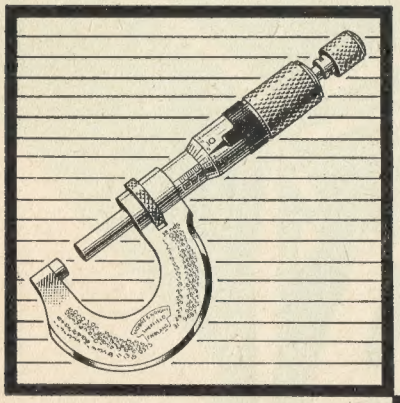
GET ONE FOR CHRISTMAS!

MADE IN ENGLAND BY ROLLS TOOLS LTD.
154/156 BLACKFRIARS ROAD, LONDON S.E.1
TELEPHONE WATerloo 3131 - 5 LINES

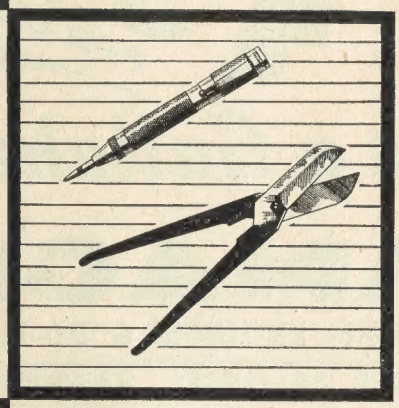
Build up your tool-kit with

M&W

Precision & Hand Tools...

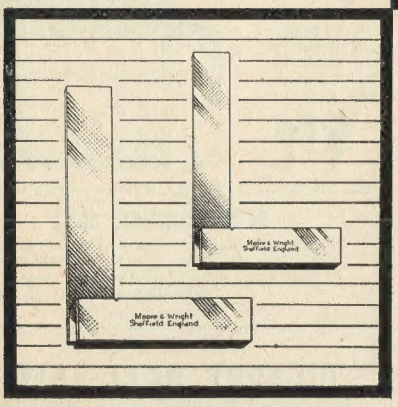


No. 961 MICROMETER



No. 281 AUTOMATIC CENTRE PUNCH

No. 295 TINMAN'S SHEARS



No. 400 ENGINEERS PRECISION SQUARES

When next you are adding to your tool-kit, remember that it pays to buy good quality tools. They last a life-time and give years of satisfactory service. Manufacturers put their names on quality tools, and the name you should ask for is M & W.

... they measure up to any job

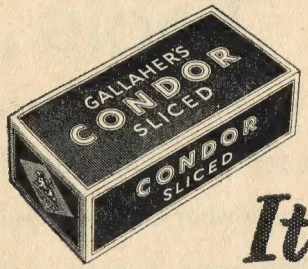
SEND 8½d. IN STAMPS FOR A COPY OF OUR LATEST CATALOGUE, MENTIONING THIS JOURNAL.

MOORE & WRIGHT (Sheffield) LTD.,

14-28 NORTON LANE, SHEFFIELD 8.

CONDOR SLICED

FOR QUALITY
FOR FLAVOUR
FOR AROMA
FOR CUT
FOR FRESHNESS

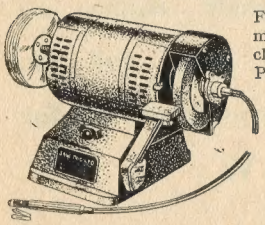


It's a Gallaher Tobacco

GAMAGES

THE STORE FOR THE MODEL ENGINEER & 'DO-IT-YOURSELF' ENTHUSIAST

The "SEWTRIC" GRINDER POLISHER



For grinding, polishing, sharpening, milling, carving, burring, engraving and cleaning on Metal, Wood, Glass, Plastics, Stone, etc. 1/6 h.p. 220/250 volts universal mains A.C./D.C. For 5 speeds from 2,500 to 8,000 r.p.m. Complete with 4 in. Grinding Wheel and a 4 in. Calico Buff.

£8 - 10

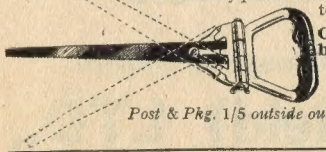
Flexible shaft 50/- extra

Or 9 Monthly payments of *CARR. PAID Gt. Britain* **20/3**

The 'CAGO' SWIVEL SAW

For cutting Metal and Wood

Hinged handle permits the blade to cut at almost any angle, however awkward or inaccessibly placed. Invaluable to Engineers, Handymen, etc.



Complete with metal cutting blade.

17/9

Post & Pkg. 1/5 outside our van area.

Woodworking Blade 2/9.

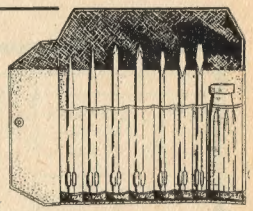
Gamage's Tool and Motor Car Accessory List free on request

SCREWDRIVER SETS

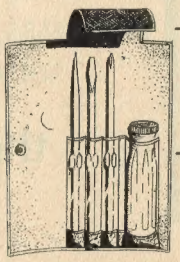
For tradesman or handyman: 7 bits. Comprising two Phillips cross-pointed and three ordinary screwdriver blades (fine, medium, coarse). One round and one square awl and handle. All fit the one handle. Strong plastic press stud wallet.

COMPLETE SET **9/9**

Post & Pkg. 9d.



AS ABOVE, but slightly lighter in weight, **7/9**



SCREWDRIVER SETS

Three sizes Phillips cross-pointed and three ordinary screwdriver blades. No round or square awls. Plastic handle.

COMPLETE SET **7/6**

Post & Pkg. 9d.

SET OF SIX PICADOR HOLE-SAWS

For increasing the scope of your ¼ in. Electric Drill

⅜ in., ½ in., 1 in., 1¼ in., 1½ in. and 2 in. clearance through ⅜ in. plate. Used with a ¼ in. twist drill it will produce clean round holes.

SET
BARGAIN PRICE **21/-**
Post & Pkg. 1/5.

GAMAGES, HOLBORN, LONDON, E.C.1 *HOL 8484* **Open Thursdays until 7 p.m.**

Model Engineer

ONE SHILLING 5 DECEMBER 1957 VOL. 117 NO 2950

Published every Thursday Subscription 65s. (USA and Canada $9.25) post free

In this issue

Next week

Harrow efficiency trials

De-magnetising

Radio control by television: Mr Ing tells how he hit the target while steering his boat with the aid of television

Barograph: An instrument for making a permanent record of barometric changes

Portsmouth regatta

Locos I have known—48: The last in this very popular series by J. N. Maskelyne

Smoke Rings

A WEEKLY COMMENTARY BY VULCAN

THE arrival of yet another Christmas Number of MODEL ENGINEER means that it is time for all of us connected with the magazine to wish a very happy Christmas to all our readers.

This is done rather early because readers are scattered in every corner of the globe; copies of MODEL ENGINEER are sent to more than 60 countries. I hope they will read these words in sufficient time to accept our sincere greetings.

At the same time, I should also like to extend the compliments of the season to advertisers and to all who distribute the magazine. Their support, and in some cases friendship, over the years has been of real assistance.

Perhaps also I might hope that you will enjoy this Christmas number. I like the cover—and I hope you will too. It was executed by Ken Carter, who was until recently an artist on our staff. He has recently left to launch out into a freelance career and I hope to see his work in many magazines—including MODEL ENGINEER from time to time.

An Oxley mystery

The article by Michael Oxley nearly did not arrive. A letter was sent two or three months ago by the Editor inviting Mr Oxley to write what is now a tradition of the Christmas number. The letter was returned a few days later, marked "gone away."

I wondered whether Mr Oxley had really succumbed to one of the deadly experiments which he has described. Fortunately that was not so—and a second letter, addressed in exactly the same way, did reach him. There is no explanation of the little mystery and I can only suppose that the first letter must have been delivered to the wrong house altogether.

Finally, may I commend to you those advertisers who are making suggestions for Christmas gifts. Perhaps a copy of this issue, tactfully marked, may be left prominently in some place where it will be seen by other members of the household.

Worth trying

I ALWAYS think that the locomotive-building fraternity are rather more conservative than our speedboat or aircraft enthusiasts. Rarely do they attempt anything in the way of experimental work (notable exceptions, of course, are Mr C. M. Keiller with his fine compounds and high pressure boilers, and Mr Denhurst with flash boilers).

But there are many special features which have been tried, often with success, in full-size locomotive practice which as far as I can recall have never been tried in models. I have in mind such things as poppet valve cylinders, Nicholson syphons, outside

Smoke Rings . . .

Stephenson's valve gear, exhaust injectors, condensing apparatus, and so forth.

Turning to poppet valve cylinders, for instance, these should be particularly successful in model locomotives where driving wheel r.p.m. is much higher than in full-size practice. Their quick opening and closing characteristics plus their ability to withstand high temperature superheat should be particularly useful.

Improved performance

The use of poppet valves in full-size locomotive work seems to have had rather mixed success.

One satisfactory application was, of course, to the ex-GCR four-cylinder 4-6-0 Lord Faringdon class. This very handsome type of locomotive was definitely improved by their use, though it always suffered from a defect in boiler design that was never corrected (the locomotives are now unfortunately scrapped); that is to say the boiler barrel was too long in relation to firebox volume and grate area.

Incidentally, it has always baffled me that such a competent locomotive engineer as the late J. G. Robinson should have fallen into this error.

Another experimental application was the rotary cam poppet valve gear fitted to the GWR Saint class locomotive *Caynham Court* in 1931. In this case there was apparently no improvement, but I suspect this was because the valve events of this class were already remarkably efficient !

Perhaps the best-known type of locomotive fitted with poppet valves was the LNER Hunt class 4-4-0. I have no official information about the performance of the engines equipped with the poppet arrangement as composed with the Shires class fitted with the normal piston valves and Walschaert's valve gear, but as they have been running for many years it can be assumed that they were a complete success.

I have myself had several good runs behind these locomotives, their short, sharp (but not loud) exhaust beat being particularly noticeable.

Cover picture

Ken Carter, until recently an artist on MODEL ENGINEER *staff, painted this impression of a Marshall traction engine rescuing a* 1906 *Renault taxi from the grip of a severe winter.*

Builds her own boats

SPECTATORS who see attractive 25-year-old Iris Phelps sailing her model boats on the Victoria Park lake in company with her husband, secretary of the Victoria Model Steamboat Club can be forgiven for thinking she became interested in this hobby through his activities.

But they would be wrong, for Iris was a model boat enthusiast before she was married and she has won prizes with her models all over Britain. But the models launched from the Phelps "yards" now are a husband-wife team effort.

Incidentally, the Victoria Model Steamboat Club, founded in 1904, is the oldest association of its kind in England.

Iris Phelps, 25-year-old wife of the Victoria Model Steamboat Club's secretary, demonstrates her scale model of a sea-going cabin cruiser

Double double

WELL, it has been done, and in silver medals, too. What has been done ? A hat trick.

Remember my paragraph a few weeks ago on the subject of ME Exhibition awards when I asked if anyone had equalled the record of Mr S. A. Walter, of Wembley, who scored a hat trick of bronze medals with his award this year? Well, I have heard from Mr A. J. Kent, of Smethwick, Staffs, who gives me the following information.

In collaboration with Mr F. H. Tapper he secured silver medals at the 1952, 1953 and 1954 exhibitions and the following year they were awarded a silver medal and Bradbury Winter Cup.

This, in my elementary arithmetic, is one up on a hat trick; a double double, in fact.

Congratulations, Messrs Kent and Tapper.

CHRISTMAS NOVELTIES

Two useful and handsome items, suitable for construction in the model workshyp, are described by ARTIFICER

For several years past I have contributed an article to the Christmas number of ME dealing with the construction of simple articles suitable for Christmas gifts. These have included such items as copper coal-scuttle cigarette boxes, wheelbarrow and wishing-well ashtrays, perpetual desk calendars, dinner bells and brass cannon.

In all cases the object of these devices has been twofold; first to enable readers to demonstrate the usefulness of the workshop from the domestic and social aspect by producing work which will be appreciated by everyone, and second to provide interesting exercises in workshop processes which will be found helpful to the less experienced reader, while not being too elementary to attract more advanced workers. The quantity of work involved is relatively small, and can be completed in a few hours.

NOVELTY NUTCRACKER

There have been innumerable types of devices for the time-honoured Christmas ritual of cracking nuts, incorporating ideas that were ingenious, artistic, Rabelaisian, and occasionally merely futile. The majority of them work on a lever or toggle principle, but screw action is not uncommon, and although slower, this has the advantage that it will deal with the hardest and toughest nuts without risk of smashing the kernel.

This item provides an interesting exercise in lathework, as it involves contours which can most readily be produced by the use of hand turning tools—a sadly neglected art nowadays—and also spherical curves, which *can* be produced by hand tools, but more readily and accurately by means of a simple lathe attachment designed for the purpose.

The material used for the essential components may be brass, bronze or duralumin—not cast aluminium alloy, at least for the stressed parts. For the base, wood or plastic material is best suited; I used to be able to obtain good material for these jobs by buying old printers' block mounts—the mounts were old, not the printers !—which were of good seasoned hardwood, such as oak or mahogany. Lately, however, laminated or other composite timber seems to have superseded the good old solid stuff for this job. The base should be fairly broad and substantial, whatever material is used.

For the ring which forms the main structure of the device, a bush or disc of metal 2½ in. dia. × 1 in. long, or a little larger both ways, will be required. A longer piece, if available, will enable all the main machining to be done at one setting and then parted off, but otherwise it can only be done at two or more set-ups. If a solid piece is used, it will pay to trepan the hole from both sides with a narrow but well backed-off parting tool, as this will save a substantial piece of metal out of the centre, instead of whittling it to waste, and getting into trouble for filling the domestic dustbin with metal swarf.

Both the inside and outside of the ring are turned to spherical curves, the object of which, apart from appearance, is to enable parts in different planes to fit together in perfect contact and to be secured in the simplest possible way. These contours can be obtained by roughing out with slide rest tools and finishing with hand tools, using templates cut from sheet metal to check the shape, but as previously mentioned, a spherical turning attachment will do the job quicker and much more accurately.

There are several types of such attachments, most of which have been described in MODEL ENGINEER at some time or other, including one recently by Duplex, but I used the very simple swivelling lever device described some years ago in connection with the ME universal vice, for machining the ball and socket mounting. This is very easily set up on the lathe cross slide, and has a wide range for both internal and external work.

I do not propose to deal at length with spherical turning operations, owing to limitations of space, but it is worth while to point out that to generate true spherical curves with any such attachment—simple or elaborate—it is most essential that the pivot should be located exactly under the required centre of curvature in both cross and axial planes; otherwise the curves produced will be either oblate or barrel-shaped, or displaced laterally.

For both the inside and outside of the ring, therefore, the pivot of the attachment must remain fixed in the same position, if the operations can be done at one setting, but it is permissible to run the cross slide back for preliminary cuts, so long as it is returned to the set position for finishing; a cross slide stop or a carefully noted index mark—watch out for backlash—will be useful in this respect.

The edges of the ring may be left plain if desired, but as designed they are embellished by beadings, formed by running in a narrow V-grooving tool and rounding off the bead with hand tools. Finally the ring is cross drilled truly across the diameter for the mounting screw and the inserted screw bush; the latter is optional but strongly recommended. It is made to press in tightly from the inside of the ring.

The screw

The metal plinth is 2½ in. dia. and the contour, after roughing out, can be finished with hand tools, the only important point being to obtain graceful sweeping curves and avoid leaving ridges or scores, but the saucer-shaped depression in the centre must be truly spherical, to a radius of 1½ in., to bed truly against the outside of the ring.

For the screw, hard-wearing material such as phosphor bronze or stainless steel is worth while, as it gets pretty heavy stress in dealing with tough Brazil nuts. The handwheel may be of plastic material, with a square centre hole to fit a corresponding seating on the screw, where it is secured by a nut; fluting or serrating the edge is recommended, but coarse knurling is permissible if neatly carried out. The pad on the end of the screw is made capable of swivelling, and is retained by a recessed screw and washer, which can be tightened by inserting a screwdriver through the underside hole in the ring, before mounting on the plinth.

The anvil is turned externally to a spherical radius of 1 in. so that it fits exactly on the inside surface of the

ring. Its top surface is concave, with V-grooves to prevent the nuts slipping while under pressure. Both the anvil and the ring are tapped to take the central set screw which secures them to the base.

CIGARETTE SERVER

This is a development of a device which I made nearly forty years ago, and as I have not seen anything like it in recent years, I have produced it in a simple and up-to-date (I will not use that much-abused term "contemporary") form for the benefit of readers. Its object is to hold cigarettes in a container which protects them from dust, and enable one cigarette at a time to be delivered as required. The example shown is made in transparent Perspex, mainly as an exercise in the working of this material —which, incidentally, is very well suited to objects of this nature—but it could equally well be made in metal, or even in wood, if desired.

The principle of the device is very simple and obvious. If cigarettes are put into either one or both sides of the container, they will naturally gravitate to the lowest point, and if the container is then raised to its highest limit on the central partition one of the cigarettes will roll into the groove on top of the latter, where it will remain when the container is lowered into its original position. If reasonably well constructed, this action is quite infallible, down to the last cigarette, and has been found quite a source of interest, even to the extent of being regarded as a sort of conjuring trick !

Job for the turners

The use of a circular turned base is optional; it may perhaps be thought that an oval or rectangular base would be more in harmony with the general design, but it would be more difficult to produce if a moulded edge is required. Readers who go in for ornamental turning, however, would take these, and much more elaborate operations, in their stride.

The centre partition is secured vertically to this base: Perspex, if cemented by the special adhesives recommended, can be very firmly secured in this way, but just to be on the safe side, I put in a single screw in the centre from the underside of the base. The appearance of this screw in the transparent material may, however, be objected to, though it is not unduly obtrusive.

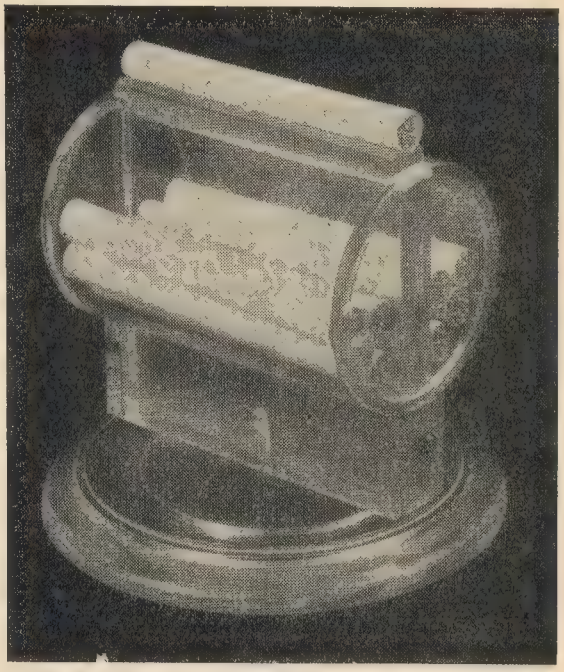
Before fitting the partition, however, the top groove, and also the grooves in the sides, should be formed. These operations can be done by end milling, without the need for any special lathe attachments, the work being simply clamped horizontally on the cross slide, packed up so that it is symmetrical above and below the lathe axis, and the cutter is run at top speed in the chuck.

Perspex machines very easily, and flat cutters or simple D-bits made of silver steel will do the job quite efficiently; for the top groove, a $\frac{3}{8}$ in. round-nosed cutter is used. If milling is objected to, this groove can be filed to shape, and the side grooves could be avoided by cutting slots in the ends of the container as an alternative.

The container is perhaps a little more difficult to make than the previous components, but does not involve any serious problems. In the first of these devices which I made, I used a piece of Perspex tube for the cylindrical section, but it has been found just as easy to make it of sheet material, and this reduces the number of bits which have to be cemented together.

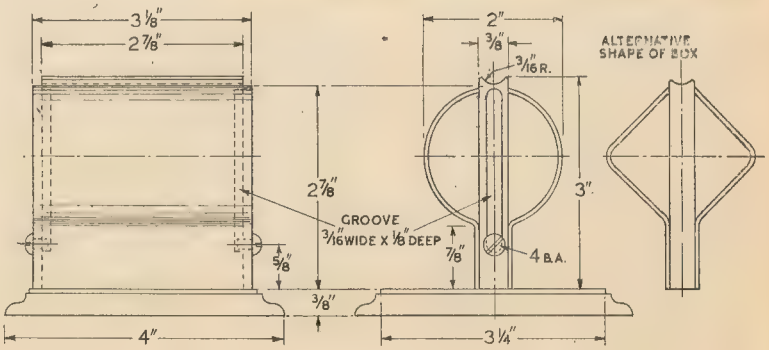
The endplates are cut out from $\frac{1}{8}$ in. material, two pieces being clamped together, so that time is saved and exact uniformity assured. Perspex is supplied with a protective sheet of paper stuck to both sides, and this should be retained while cutting to shape; not only does it prevent scratching the highly polished surface, but it also enables marking out to be done with a sharp pencil. A fretsaw may be used for cutting out, and a medium fine file for finishing the contour exactly to shape.

For the wrapper, $\frac{1}{16}$ in. material is suitable, and two rectangular pieces



Right: The dust-proof cigarette holder made in Perspex material

Below: Constructional details of the cigarette box



a little over 7 in. long and 3⅛ in. wide should be cut out. The Perspex can be softened sufficiently for bending by immersion in boiling water for a few minutes. It is best to make the sharp bends first, and a simple jig may be improvised for the purpose by fastening a strip of hardwood ⅞ in. wide to a flat board with two wood screws about 3½ in. apart. The screws are then loosened sufficiently to allow the heated Perspex strip to be inserted between the parts, and re-tightened down, the projecting material being then bent by hand and held in position until cool.

The same jig, with the addition of a half-round wooden pad, may be used to form the cylindrical curve, after re-heating the material. The curvature should be a little more pronounced than is finally required, to take care of any "come-back" when the strips are released from the jig; it should practically snap into position on the endplates and require little holding in place while being secured with the special Perspex adhesive. The endplates may be held temporarily in their correct position, at the specified distance apart—which, by the way, is suitable for all standard brands of cigarettes—by clamping to the sides of a dummy partition, of wood or metal ⅛ in. thick.

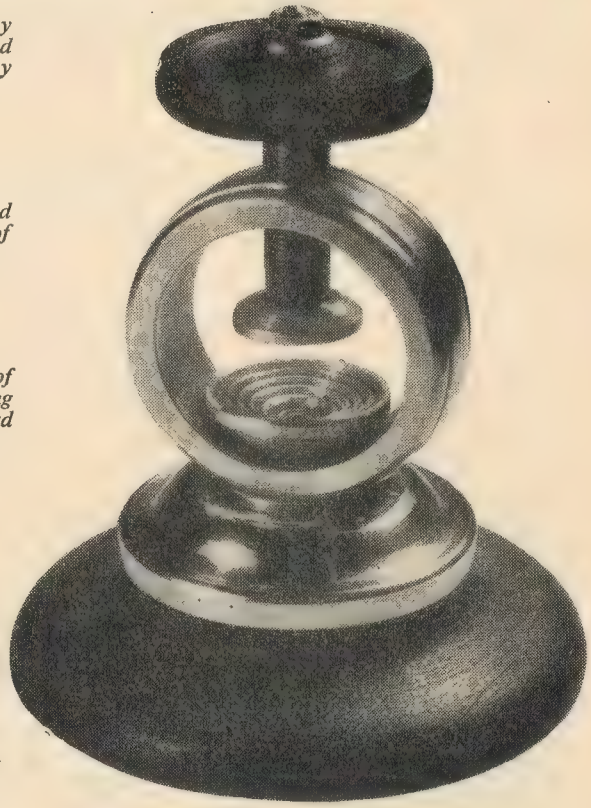
As an alternative to the cylindrical container, it may be made square, hexagonal or other symmetrical shape, provided that the essential condition of a sloping lower surface is observed; otherwise the cigarettes will not roll towards the centre, and the last two or three may not be delivered properly.

The stop screws are, of course, fitted for the purpose of preventing the container being lifted off the partition altogether; at the top limit, it should be just high enough to ensure that a cigarette rolls properly into the groove, and when fully lowered, the partition should be just projecting. To fill the container, it should be partly or completely raised and the cigarettes dropped in one at a time. With reasonable care in fitting, the container should be almost airtight when lowered, while free to slide quite easily on the partition. The final operation is the polishing, which is most effectively done by using Nos 1 and 2 Perspex polishes, specially prepared for the purpose.

Perspex and other plastic materials, together with cements and polishes, are obtainable from Plastic Services Ltd, Brighton, or Messrs G. H. Bloore, of Mill Hill, London, NW7.

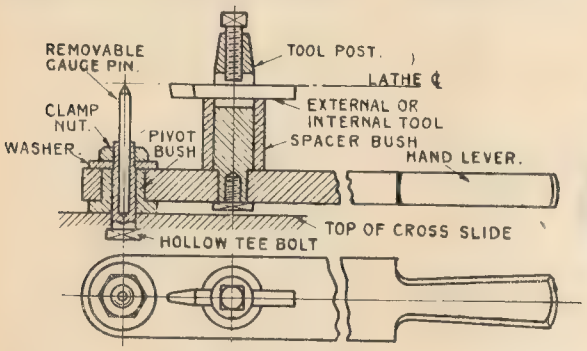
And now, to all those readers who construct these trifles—and also those who don't—I conclude with my best wishes for a very happy Christmas, and many profitable hours in the workshop in the New Year. ▣

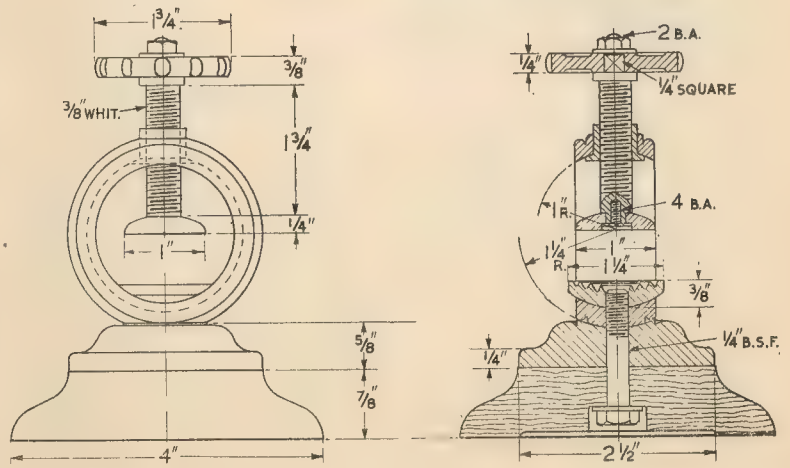
Right: The novelty nutcracker designed and constructed by Artificer



Bottom: Front and side elevations of the nutcracker

Below: Details of a spherical turning tool for external and internal radii

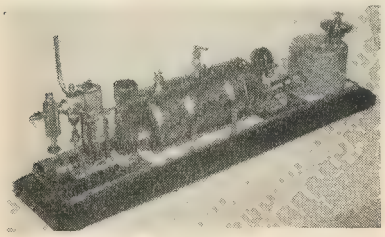




IT is more blessed to give than to receive. But the problem, at Christmas, is precisely *what* to give. The better we know a person the more difficult the choice may be, for our hope then is to please him by bearing in mind his special interests, and when we come down to the details all kinds of questions arise.

My purpose here is merely to throw out a few hints for the readers of MODEL ENGINEER. Not infrequently a model engineer's closest or oldest friend is a fellow modeller and presents are, as by long-familiar rite, exchanged between the two. But what I most have in mind is the kind of present that the modeller may give himself—with the feeling that he deserves it !

An excellent suggestion, as charming as it is practical, has been sent to me



by a director of D. M. Rogers at 31 Nelson Street, Southport, Lancs. " By making early application for our list," writes an executive of this distinguished company, " the Master of the House could, we suggest, tick the items in which he is interested, and leave the choice to that long-suffering heroine —the wife of the model engineer ! In this way the element of surprise, which is so much a part of receiving a present, is retained."

To the model engineer " who is contemplating building a workshop, or is constantly sawing the odd piece of wood on the best carpet " there is, in the list, a basic sawbench unit comprising an aluminium cast housing

You may have difficulty deciding what to give friends and relatives. But something for yourself is a simple matter—or is it? To help you to come to some conclusions JOSEPH MARTIN invites you to take a look at what the trade has to offer at this time of the year

Left: Bond's powerful double-acting steam plant suitable for boats up to 48 in. long

Above : Also from Bond's, a parting-off toolholder and, below, a lathe toolholder

with shielded ball races, a double-ended spindle threaded for a ½ in. chuck and saws up to 8 in. dia., and all complete with a ready-slotted and flanged steel table 18 in. × 10 in., a pulley, and fixing screws and nuts. It needs no machining to put into operation and is, at 54s. 9d. post free, a bargain for these expensive days.

One list which year by year speaks of Christmas to hosts of our readers is the model engineering catalogue from Bonds o' Euston Road. For the man with a workshop I suggest a lathe toolholder, straight pattern, to take $\frac{3}{16}$ in. tool bits, either $\frac{3}{8}$ in. square or ½ in. square shank. The price is 14s. 6d. For 28s. you can have a parting-off toolholder to take ½ in. deep tool bits, with ½ in. shank. There is a vernier calliper with 6 in. reading at 32s. 6d. and with 5 in. reading at 9s. 6d. And I know that you would like a Wolf Cub electric drill, if you do not possess one already. The standard 230-250 v. drill costs £6 12s. 6d.

For the model locomotive builder there is a large range of ½ in. scale wheel castings as well as many other types of castings and parts. At ½ in. scale a bogie wheel costs 10½d., a tender wheel 1s. 4d. and a driving wheel 2s. 10d., while the corresponding prices for ¾ in. scale are 1s. 9d., 2s. 3d. and 4s. 6d.

There is also plenty at Bond's for the model boat builder. Bond's make a powerful steam plant suitable for boats up to 48 in. long. The double-acting slide valve engine, $\frac{9}{16}$ in. bore × ½ in. stroke, costs £5 10s., the copper-centre flue boiler £4 10s., and the special methylated spirit blow-lamp £2.

Those propellers

Most ship modellers already know the reputation of Bond's for propellers. The three-blade brass propellers, l.h. or r.h., are all of correct pitch. You can get the 1½ in. dia. propeller for 5s. 6d., the 1½ in. for 6s. 6d., the 2 in. for 7s. 6d., the 2½ in. for 9s. 6d., and the 3 in. for 11s. 6d.

At Bond's, too, the aircraft modeller knows himself among friends. With an 11s. 9d. Super Detail Aurora kit he can make up a table model of a Convair VTO, Lockheed P38 Lightning, Lockheed F90, or Boeing P26A. The Focke Wulfe is cheaper, at 8s. 3d.

The builder who wants a real flyer will be interested in the American Berkley kits: the Colonial Skimmer amphibious model with 33½ in. wingspan at £2 5s., the Mitchell B25 with 42 in. span at £8 15s., and the giant Super Navion with 64 in. span at £9 15s. Engines are extra.

Packing and carriage are extra, but why not write for Bond's Model Catalogue (2s.) or the Tool and Light Engineering Catalogue (1s. 9d.)?

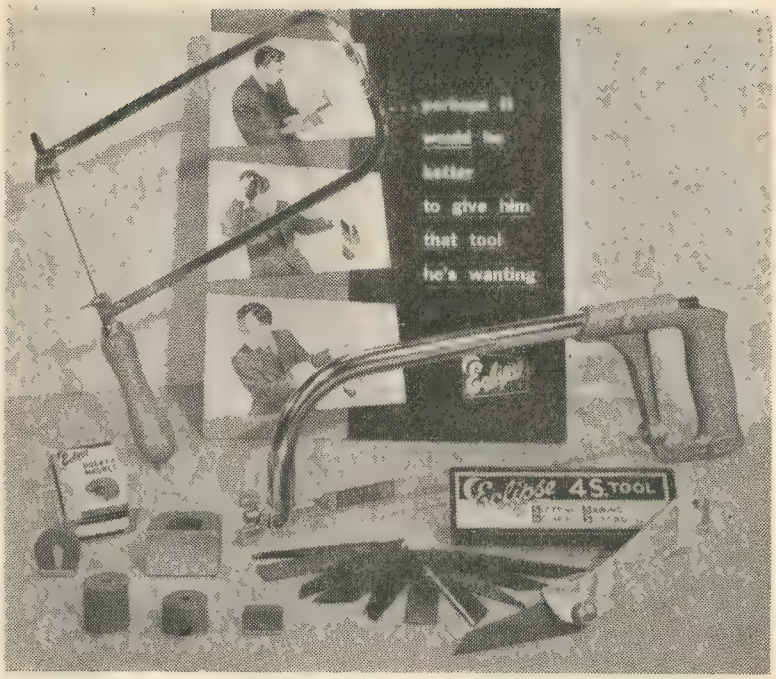
Kennion Bros (Hertford) Ltd, at 2 Railway Place, Hertford, Herts, are issuing two current catalogues. You pay 1s. 9d. for the two and get your money back on your first £1 order. And there is much in each of them that you are bound to want. You can get pin drills or counterbores at £1 18s. 6d. a set (post 1s. 6d.) and D-bits at £2 3s. 6d. a set (post 1s. 6d.), or you may choose one of the special sizes of taps and dies, from a tap at 2s. 9d. to a complete set ($\frac{1}{8}$ in. to $\frac{1}{2}$ in.) at £4 16s. 6d.

The locomotive builder will note in particular a set of parts for a passenger-carrying swivelling bogie. Made in almost unbreakable silicon aluminium, the parts provide a perfect passenger truck for locomotive hauling. At 3 in. gauge the set for each bogie costs £2 4s. 6d., and at 5 in. gauge £3 9s. 6d. Kennions can also supply the finished bogie at £4 2s. 6d. for $3\frac{1}{2}$ in. gauge and £6 9s. 6d. for 5 in.

Did you know that there were three generations of Kennions at this year's Model Engineer Exhibition? There was George Kennion, who has displayed his wares from the very first exhibition; there was Charles Kennion, who has been with every exhibition since the war; and there was Brian Kennion, grandson of George and son of Charles, who had the tool stand. One feels safe in dealing with a fine old family firm which has proved itself through many long years.

Reduced—and increased!

I have also been looking through two catalogues from a famous company in the North, James Neill and Co. (Sheffield) Ltd, at Napier Street, Sheffield 11. All our readers know the reliability of Eclipse Tools. With such a variety listed it is difficulty to make a particular suggestion, but I think that the Eclipse fretsaw, the Eclipse 20 t. hacksaw frame and the Eclipse 4S tool are especially worth noting as gifts. The second catalogue bears the title "Small Magnets Are So Versatile"—a reminder of another popular Eclipse range which is deservedly famous.

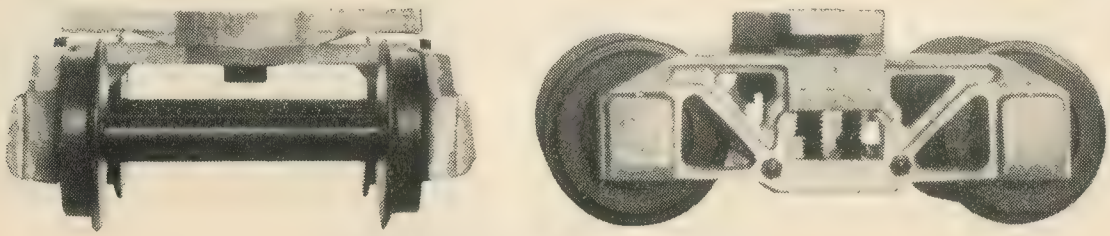


A selection of Eclipse tools

The Boxford Little Giant toolpost grinder, specially designed to increase the versatility of the Boxford $4\frac{1}{2}$ in. lathe and lathes of similar capacity, has been reduced in price from £23 to £19 15s., and at the same time its horse power has been increased from $\frac{1}{16}$ to 1/10. T. S. Harrison and Sons Ltd, of Union Street, Heckmondwike, Yorkshire, are the manufacturers, while their subsidiary company, Denfords Engineering of Boxtrees Mill, Halifax, created the famous Denford lathe.

As the years go by, tools improve. Kennedy's, of West Drayton, Middlesex, have added an automatic knock-off to the Kennedy portable power hacksaw; this switches off the motor immediately the cut is completed. As further improvements, a carrying handle is fitted as standard, all steel parts are plated to prevent rusting, and clamping screws have their heads on the right of the frame, permitting easy access for tightening. A 45 deg. vice, supplied as an extra, will cut up to $1\frac{1}{4}$ in. at 45 deg.

These efficient little hacksaws are used in more than fifty countries, and many of the users are model engineers. Tools of quality are a tremendous advertisement for Britain—a reminder in these days of high competition that the birthplace of the First Industrial Revolution is still the home of craftsmen who are never better than when catering for other craftsmen in every part of the world. It is good, too, at Christmas to remember that tens of thousands of men are using precisely similar tools. Wherever the modeller finds a Myford



The KB Swivelling Bogie for passenger trucks

lathe he knows himself on friendly ground. A name such as Myford or Dormer unites men like the name of Bob Cratchit or Tiny Tim.

S. Tyzack and Son Ltd, of 341, 343 and 345 Old Street, Shoreditch, have three suggestions for the workshop. Their three-jaw self-centring drill chuck of 0-¼ in. capacity, with screwed arbor to fit Black and Decker or Wolf drills, are priced at 25s. 6d. complete. A beautifully-finished tailstock die holder to take both $\frac{13}{16}$ in. and 1 in. o.d. dies is yours for £1 2s. if you want No 1 MT (a shilling more if you need No 2). Vertical slides with calibrations are offered in two types: the accurately-machined plain slide 5 in. × 3 in. table at £3 5s. and the swivel-base slide 5 in. × 4 in. table, machined with similar accuracy, at five guineas.

As thousands of model engineers are aware, the Reliance Tools from H. D. Murray Ltd, of Queensway, Ponders End, Enfield, Middlesex, have long justified their name. Let

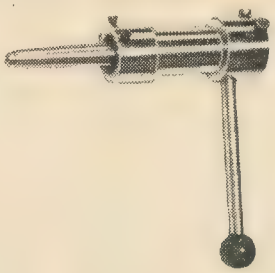
A set of spanners in a neat case supplied by A. J. Reeves and Co.

me pick a few which would be suitable for Christmas.

The precision-geared drill chucks, with key, come in a variety of sizes and in prices from £1 19s. 6d. (0-5/32 in. Cap. No 0 taper hole, medium duty) to £2 4s. 6d. (0-½ in. Cap. No 33 taper hole, medium duty), and the list also includes drill chucks of the Millers Falls pattern fitted with concealed springs, at 9s. 3d. to 18s. 3d., and those of the Goodell pattern with coil springs, at 8s. to 11s. 6d. No fewer than thirteen arbors for precision-geared drill chucks are listed, most of them at 4s. 6d. and three at 2s. more.

If you fancy a valve re-seating outfit you can have one (45 deg. cutters or 30 deg.) for £4 11s., and if you intend to keep under £1 you may find an idea in the BA socket sets at 7s., 9s. 3d. and 13s. 9d. Lathe centres are here at prices from 4s. 9d. to 12s. 6d., and thread files from 14s. 6d. with a collet fixture at £2 7s.

The Record edge tool honer from C. and J. Hampton, of Record Tool Works, Sheffield 2, is likely to solve more than one reader's gift problem.



Left: A tailstock die holder and, on the right, a vertical slide which are obtainable from S. Tyzack and Son

Used with an oilstone—and it is very easy to use—it simplifies the sharpening of chisels, plane irons and spokeshave irons. The thumbscrew and swivel pad give a firm grip on the tool, and the large rotating stainless steel ball running in a ball race permits a universal movement on the oilstone, allowing the whole surface to be employed.

No one can go far wrong in giving a model engineer some kind of tool. The simplest tools are usually a safe choice because they are always needed for one purpose or another. A. J. Reeves and Co. Ltd, of Birmingham (416 Moseley Road, Birmingham 12), have sets of open-end spanners in chrome steel, plated, with polished heads. Three together (0/2 BA, 2/4 BA, 4/6 BA) cost 9s. 1d., and five together (0/9 BA) 13s. 6d. For 27s. 4d. you can have a larger set with five open-end spanners and three of the ring type. You may also be interested in a super chrome miniature socket set (1 to 8 BA, with a 6 in. handle) at 26s. 1d. Each set arrives post paid in a plastic wallet, transparent at the front.

Workshop men have been buying the products of B1-Metals (Britinol) Ltd ever since 1899. One of their special attractions this Christmas is the Popular soldering unit containing a Britinol spirit blowlamp, a Britinol telescopic soldering iron, and supplies of Britinol paste and cored wire solder. Packed in a cardboard box, the kit has everything for soldering—and the price is only 17s. 6d. direct from St Mary's Works, Bridge Road, London, N9.

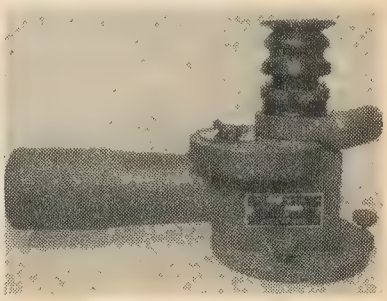
At Christmas, more than at any other time of the year, we like to feel that we have everything at hand for our convenience and comfort. It is the small things which make all the difference; and it is also the small things which we are most likely to forget. Do you, for instance, need a new tin of Fluxite paste before the holiday? And if there are any draughts about, a 20 ft phosphor bronze strip about ⅝ in. wide × 0.005 in. thick, supplied by H. Rollet and Co. Ltd, of 6 Chesham Place, London, SW1 (and also of Manchester, Leeds, Liverpool and Birmingham), may make your Christmas cosier. The price is 9s. 11d. complete with nails.

Not a draught but a cheerful seabreeze blows from the list issued by Charles Frank at 67-73 Saltmarket, Glasgow, C1. A bubble sextant at 67s. 6d., an ex-government signalling lamp at 12s. 6d., an ex-naval lifesaving torch at 3s. 6d.—these are a few suggestions from this noted firm which has been established exactly half a century. German battleship binoculars produced by Ernest Leitz, of Leica, cost £26, and ex-government stop-watches as little as 55s. post free.

A tank commander's periscope about 11 in. long, with binocular vision through large wide-angle lens of 1¾ in. × 5¼ in. at each end, seems astonishingly cheap at 15s. 6d. (with 3s. postage). Watson's Eastern Motors, of Aldeburgh, Suffolk, describe it as ex-government and brand new. It can be lengthened, if you wish, without much difficulty.

Watson's specialise in ex-government equipment. They have something special for the modeller in their small unused 12 v. shunt-wound d.c.

●*Continued on page 773*



A telescope elbow

PATTERNS with FINS and FLANGES

By Geometer

PARTICULARLY in the case of providing cooling fins is the method of making patterns and obtaining castings often superior to the alternative of machining parts from the solid. All-over machining of fins is possible for the cylinder barrels of small air compressors and four-stroke engines, and those of two-stroke engines above the ports. Similarly, in the case of cylinder heads, turning fins from the solid is practicable for simple types as may be used on compressors and some two-stroke engines.

The method of turning from the solid, however, does not cover cases of cooling fins round two-stroke exhaust ports, angular fins on barrels (when these may be inclined and a straight-line flow of air is desired), and where fins on cylinder heads may be disposed vertically or radiating from a centre line. Then pattern and casting provide straightforward means of overcoming the problem—the only other solution to which would be some awkward milling operations. Cast fins may also be much improved by work on them with files, burrs and emerycloth, and are certainly better than none at all.

For small engines and compressors fins may be provided on cylinder barrels, either by turning simple patterns from solid wood, or by building up and using separate pieces of flat wood for the fins. For the process of turning from the solid, the wood must be hard, close and uniform in the grain. Boxwood is probably best, though good beech can be used. The pattern should be turned as at *A*, with the fins, the plain portion of the barrel and a core print each end, *Q* and *R*, for the bore.

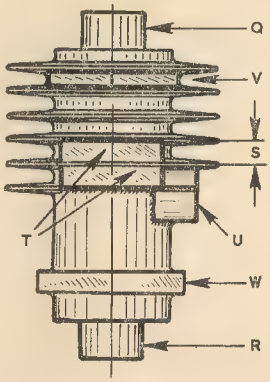
Spacing of the fins, *S*, should not be less than about 9/32 in. or $\frac{5}{16}$ in., their depth not more than about $\frac{5}{8}$ in., and their outside diameter not more than about $2\frac{1}{2}$ in. These dimensions can, however, be modified somewhat. Less deep fins could be spaced slightly closer while wider spacing would admit of their being somewhat deeper. Their thickness at the bottom should be 3/32 in. to $\frac{1}{8}$ in., joining to the barrel by a $\frac{1}{16}$ in. radius while the tip thickness should be about $\frac{1}{16}$ in. rounded.

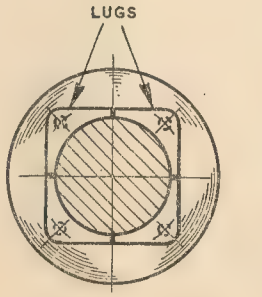
For a two-stroke engine cylinder, pieces can be fitted into the fins for the ports, keeping always to the principle of avoiding undercuts which would prevent clean moulding. For the exhaust ports, blocks can be fitted, glued and tacked, as at *T*, and another block, *U*, for the inlet port. On the further side of the pattern, the block for the transfer passage would extend from the base flange up to the level of the exhaust ports. Radii may be provided at the joins with plastic wood.

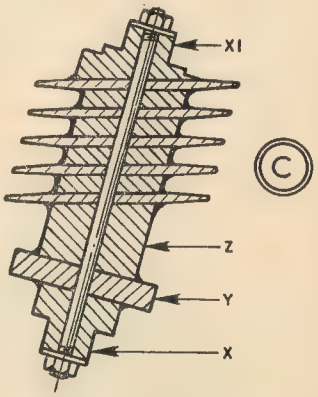
For securing the cylinder head, lugs are required at the top of the barrel to tap to accept studs. Similar lugs are, therefore, required on the pattern in the space *V*. These can be provided either by turning the space only to a depth to give the dimensions over the corners, then sawing and filing away the material along the flats; or the space can be turned to normal depth, then separate lugs fitted in as at *B*—a sectional view. The base flange *W* can be made by turning to the corner dimension, then cutting away along the flats. The flange must be in square alignment with the top lugs.

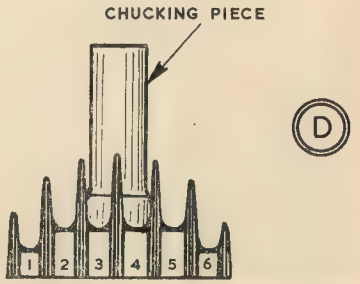
Construction of a built-up angular fin pattern can be as at *C*, the ends carrying core prints *X*, *X*1. The base flange *Y* can be a separate piece from flat wood. The plain barrel *Z* can be turned as a short length joined to the top carrying the core print *X*1 then cut through at the fin angle. The fins and spacing pieces can then be from flat wood, the spacing pieces clamped up and turned before the fins are fitted. Fin spacing will thus be uniform and precise.

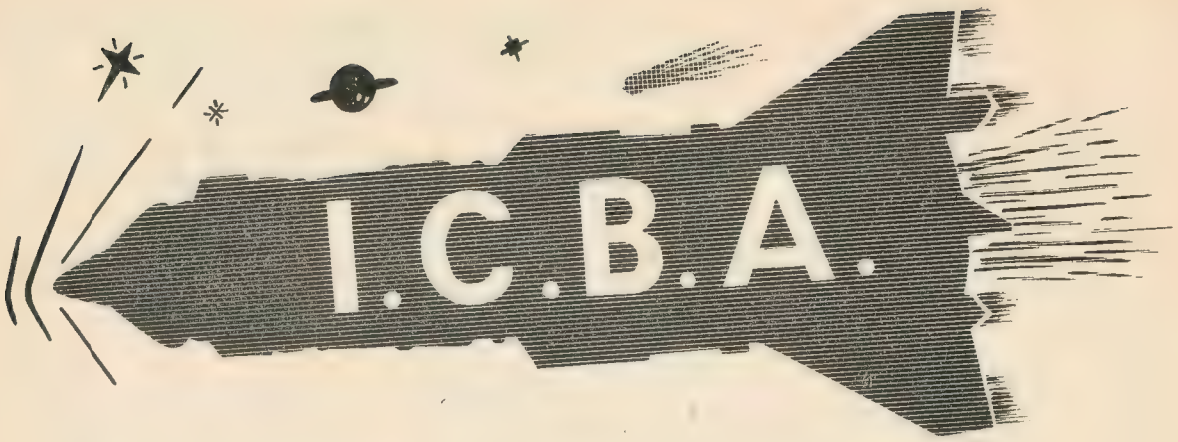
Similar accuracy obtains when making cylinder head patterns, as at *D*, by cutting the fins from thin flat wood (beech or oak), and gluing and tacking together with spacing blocks between—1 to 6. ▣











Just in case anyone doubts that we're a Space Age Power MICHAEL OXLEY recounts the amazing story of the Inter Continental Ballistic Aunt

My last article, in which I described how my Grandfather, the illustrious John Trevithick Oxley, built the Forth Bridge, was very favourably received, and many readers have asked me to write an account of another of his engineering triumphs.

I considered telling the fascinating story of the *Great Eastern*, the largest ship ever to be built with paddle wheels at the ends for going sideways in head winds. Actually, it is not generally known how such an enormous ship ever came to be built. By an oversight Grandfather and Brunel were both awarded contracts, and when they had finished nobody wanted two ships that size, so Brunel's hull was riveted inside Grandfather's, which was slightly bigger. That is how she came to be the first vessel to have a double hull, paddle wheels and a screw.

This epic would have been especially appropriate now that we have our ship modelling friends with us as they would have learnt a lot from the great J.T.O., but unfortunately there was a snag. I read through the many volumes of notes left by Grandfather on the subject, and after I had struck out all the swear words, obscene references to Disraeli, etc., there were only nineteen words left, which, of course, is not nearly enough.

Next, I thought of writing about some experiments I have been making in connection with the first British Satellite. Tremendous publicity has attended the Russian and American efforts in this direction, but it must not be thought that we in Britain are lagging far behind. Such is most definitely not the case, and remembering my brilliant work in the last war, when I discovered the new element UGHIUM, I was called in by Whitehall at a very early stage.

Unlimited facilities were placed at my disposal. A 1910 reversible lathe with gutta-percha treadle and set of whale-bone collets, a mahogany pill-moulding machine with leather busks, a pair of plastic binoculars made in Hong Kong—no expense was spared. My instructions were to build a series of ballistic missiles of gradually increasing size and complexity culminating in a manned satellite. " Manned " is, perhaps, not quite the right word, as my aunt was destined to be the occupant. She has always been a bit of a problem.

However, it was not long before Project I was ready. This consisted simply of a copper sphere about 4 in. in diameter containing two mice, a quantity of cheese and the secret UGHIUM propelling unit. It was successfully launched and put into a fixed orbit centred on Shepherds Bush Green—which it encircled at a great height every four hours.

All went well until the ninth orbit, when it collided with a trolleybus and became so firmly embedded that the bus had to be withdrawn from service and taken to the depot at Wood Green where they have a machine for removing squeaking copper spheres

Many times Auntie had trouble with her piezometer leads

from trolleybuses. When opened, the sphere was found to contain no fewer than eighteen mice, a cosmic phenomenon which I am still investigating with interest.

Incidentally, the mice had eaten all the UGHIUM, and, at the time of the accident, the missile was apparently being propelled entirely by the cheese.

Project II was to be a three-stage unmanned rocket designed to reach a height of 21,000 miles. Progress was halted for a time owing to the difficulty of obtaining a bottle large enough to stand it in. Eventually a suitable one was procured from the Large Glass Bottle Blowing Company, of Wapping, and launching thereupon took place.

The author deals rapidly with an obstinate pipe. The body of the rocket was machined from 3 ft dia. cardboard bar

After the shattering roar had died away I peered out from the dustbin in which I had been sheltering and was delighted to see that the rocket had disappeared from view. It was not equipped with orthodox wireless as I had been unable to squeeze the horn of the loud speaker in, but I had arranged a very ingenious system of communication: an unsuppressed Ford V8 engine was attached to the rocket stick with stout wire, and this was set to run at full revs just before take-off. I had obtained a second-hand TV set, and the engine should have emerged on the screen as a lot of dots and wiggly lines.

As soon as the rocket had gone I dashed indoors and switched on. At once I became engrossed in the adventures of the Flowerpot Men. Their antics were really most diverting. They were followed by an exhibition of fisticuffs and an animated film about pews, and many agreeable hours passed before I realised, with something of a start, that no signals were coming through from Outer Space. This was very puzzling, but I assumed that the engine had become detached or that the rocket had achieved escape velocity and had, er, escaped. Greatly elated by this thought I pressed on with Project III —the Manned Satellite.

Large quantities of highly-irradiated cheese were prepared, a vast launching bottle was installed and Auntie was measured up for a blue-serge space suit with plastic ear-flaps and lead lined button-up boots. I began to accustom her to a state of no-gravity by causing her to be suspended for several hours a day on a jet of compressed air, like a ping-pong ball in a shooting gallery. I adapted an ex-WD Vickers machine gun to function as an automatic feeding device for her. It forcibly ejected a mince capsule at set intervals, but owing to the rolling motion which the air jet imparted to Auntie synchronisation was very critical and many times she was let down with a capsule of mince firmly wedged in each ear.

At last the Great Day dawned. Auntie had insisted on taking her knitting with her, so a quantity of special cosmic rayon yarn was put aboard together with a selection of asbestos needles. The machine gun was loaded with mince capsules and a two-inch layer of a proprietary brand of soap powder was laid on the floor to provide a constant supply of oxygen.

Once again radio was not fitted owing to incompatibility between Auntie and the loud-speaker horn, but she was provided with a very powerful loud-hailer supplied with current from a dynamo driven by bicycle pedals.

Her instructions were to pedal like mad and shout Bleep-bleep, Bleep-bleep, at ten-second intervals. In addition, I fitted another Ford engine and obtained an even older TV set. A directional gyro was provided in the nose, and Auntie was to keep the turbo-motor going at 300,000 r.p.m. by blowing through a rubber tube clamped to her nostrils.

In case of failure the rocket could be steered manually by a system of levers attached to her left knee with rubber bands. Her right knee was left free for doing odd jobs such as wiping her glasses, etc. A high-density concrete hat, an overnight bag and a box of peppermints completed her equipment. Launching procedure was simplicity itself. All Auntie had to do was pedal the generator, shout Bleep-bleep, snort down the gyro activator tube, waggle her left knee and start knitting, while I pressed the firing control.

86, 85, 84 . . .

Zero hour approached, and Auntie was carefully lowered into the spring-loaded trousers I had designed for minimising the effects of acceleration. The door was screwed on (with thrupple nuts, of course) and I began to count backwards, like they do. I had only reached 84 when the emergency red light flashed on, a loud bell began to toll, a constant stream of Very lights poured from the nose of the rocket and a series of heavy lead balls dropped from pockets round its base.

These effects led me to suppose that something might be wrong inside, so I removed the door and peered in. It did not seem a serious fault, merely that the feeding gun had run amok, causing Auntie to be up to her neck in warm mince. I soon had her hosed down and re-inserted.

Once more the door was closed and all was ready. I gave a farewell clang on her second stage to which she replied with a brave Bleep-bleep. It came through so strongly on the loud-hailer that I was thrown against the firing button. When I recovered consciousness Auntie had gone, leaving no trace except for a blackened hole in the ground. I staggered indoors,

and the next few hours were divided between watching the TV screen for blips and listening up the chimney for bleeps, all to no avail.

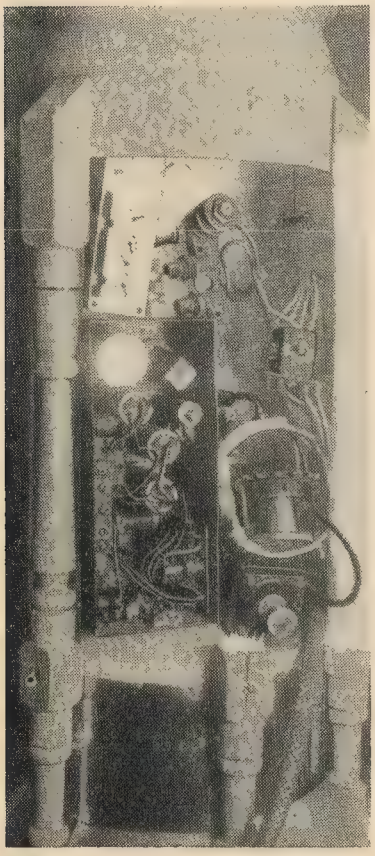
The absence of audible signals was not surprising, for without her boots Auntie would have some difficulty in reaching the pedals. But the lack of spots on the TV screen puzzled me—until I remembered that I had forgotten to start the engine. The answer was simple. A design was got out for a rocket-propelled starting handle which would rise to a great height while revolving rapidly, and would then automatically home on to any Ford V-8 engine in the vicinity.

Three of these were made and sent up but they had no result, except for three legal actions for damages from irate Ford owners whose cars had been drilled through from front to back.

I took a drastic step. Jodrell Bank was informed. Night after night they swept the heavens with their giant bowls, but nothing remotely resembling my aunt was detected. I did not expect to see her again, so I converted her sewing machine into a high speed jig saw—a plan that had been maturing in my mind for many years.

However, I reasoned that Auntie must be somewhere—I mean she always had been before—so I reported to the authorities that Project III had been successfully completed. This news caused much rejoicing in high places. A great dinner was held in my honour, at the conclusion of which the PM planned to give the eagerly-awaited news to the nation. At last we could afford to laugh at the bungling efforts of the Russians and the Americans. We would be the first great Power to possess the dreaded Inter Continental Ballistic Aunt.

Then, at the eleventh hour, a most dramatic development took place. I happened to go into the garden to nail up a small notice Get Rich Quick at the side of my compost heap when I distinctly heard a distant Bleep-bleep. I scanned the sky in all directions but could see nothing. Then I heard it again, very faintly: Bleep-bleep—I've used up all me wool—Bleep-bleep.



The nerve centre of the missile with one baluster removed to expose the intricate mechanism

Down in the depths

Then I realised that the sound was coming from the cavity which the rocket had blasted in the ground. I put my ear to the orifice and there was no doubt about it. Auntie's bleeps were wafting up from the depths.

Utterly baffled, I sent for tackle and set about retrieving the rocket, which proved to be at the bottom of a two mile deep hole. With a spanner held in my trembling hand I unscrewed the door, my mind divided between contemplating the condition she would be in after all this time and wondering how quickly I could convert the jig saw back into a sewing machine, should this prove necessary.

As I removed the last nut the door burst open and a huge cloud of foam poured out. It seemed that Auntie's water tank had burst, showering all over the soap powder. After she was got out, rinsed in several changes of water and rough-dried she seemed no worse for her experience.

She was also suffering from a slightly flattened head through being taken by surprise when the rocket had unexpectedly gone the wrong way. During her sojourn below she had knitted herself three tennis nets —singularly useless articles for a space ship.

I retired to my workshop to try to discover what had gone amiss. Once again I fed masses of data into my steam-operated computer, and the trouble was soon detected. An old bus ticket had accidentally got mixed in with the punched cards. This had interchanged the reproduction constant with the leakage factor, which naturally converted fission into fusion.

Path of rocket, showing its reaction to osseous deposits

This more than balanced out any reactivity gain arising from burn-up of the free neutrons, causing a flattening of the flux which, in turn, reduced the emission of high-energy UGH-IUM particles to a negative level.

In short, I had made rockets that sucked instead of blew. Instead of soaring into Outer Space they had drawn themselves down into the bowels of the earth. John Trevithick would have given his whiskers for one of these when he was building the Mersey Tunnel!

I at once saw the possibilities of the idea. The Coal Board was approached and at the present moment another seven hundred and forty offices are under construction in which to consider the matter.

As I have already mentioned, I had thought of writing about these experiments, but, of course, security regulations utterly forbid me to do this. So this year I propose to describe the construction of a clock I have just made from an old flattened-out saxophone. This unique clock . . .

● *Unfortunately we cannot spare Michael Oxley any more space. We shall just have to wait another year for details of what is, no doubt, a horological masterpiece.*—EDITOR. ▣

The Little October Railway

★

Now that tourist travel to Russia is possible again the enthusiast has an opportunity to see something of what that nation is doing to promote railway interest among the children. This report comes from J. H. PRICE, an authority on Soviet railways

A visit to Russia can be a fascinating experience for the live-steamers. But the Russians, are not used to railway enthusiasts, and photography of any aspect of railway activity is very severely limited.

There is little evidence of amateur railway modelling, though it must be said that the railway apprentices produce fine scale models for exhibition purposes, and one can see plenty of train sets in the shops—clockwork and electric. There is also a gauge O tinplate version of the Moscow Metro.

But the narrow-gauge steam enthusiast will be in his element, for on the outskirts of each Russian city he will find a Children's Pioneer Railway, a narrow-gauge line built to give children interested in a railway career the chance to learn the job while still at school by running their own scaled-down trains.

The Russians are very proud of these pioneer railways, and visitors are allowed to photograph them to their heart's content.

The first Children's Pioneer Railway was opened at Tiflis, Georgia, in 1935. Today there are 34. Together they have more than 75 stations, and their combined route length now exceeds 100 miles. Each is looked after by the local division of the state railways, and has a name—for example, the Little Transcaucasian Railway at Tiflis and the Little South-Western Railway at Kiev.

The BBC team who recently drove to Moscow described the Little Byelorussian Railway at Minsk, and last summer I was fortunate enough to visit the Malaya Oktyabrskaya (Little October) Railway at Leningrad, named after the main-line October Railway which stretches, straight as an arrow, across the Russian plain from Moscow to Leningrad.

The Little October Railway is of 75 cm. gauge (about 2 ft 6 in.), is five miles long, and was opened in 1948. It begins at Kirovskaya station, in the suburb of Novaya Derevnya, and runs northwards through fields to a halfway station named Zoopark, the future site of Leningrad's zoo, from which it continues to Ozernaya terminus in the suburb of Oserki. Both ends of the line are easily reached from the city by bus, tram or suburban electric train, and at summer weekends hundreds of visitors, adults and children, come to ride on the miniature trains and watch the youthful railwaymen *and* railwaywomen at work.

The children begin when they are ten, and spend a certain number of days in each summer working three-hour shifts on the railway until they reach the upper age limit of 15.

A big job for a 14-year-old! This young fireman grins happily from his roomy cab on Little October engine PT. 02. Livery is royal blue with red motion and white wheel rims. Top of page: A shot of another pioneer railway—the Little Byelorussian Railway at Minsk

During their service they can try their hand at every job, from porter and crossing keeper to pointsman, ticket collector, signalman, engine driver and station master. The only adults are the booking clerks and instructors, though state railways personnel carry out repairs and maintenance.

The service runs daily except Tuesdays from May to the beginning of September, and in winter the stock is removed on flat trucks for overhaul and repainting at the state railways workshops, where it is stored until the following spring.

The normal timetable provides for five trains a day in each direction between midday and 6 p.m., with two of the line's three engines in steam.

Above, left: No PT. 02 leaving Kirovskaya for Ozernaya and, right, a fellow tourist watching the driver oiling the motion of PT.02 at Zoopark station

Right: Ozernaya station booking office

Each train consists of three dark-blue bogie coaches drawn by a stocky little blue 0-8-0 with a large enclosed cab; the coaches are small editions of traditional Russian main-line stock, but the locomotives (built in Finland in 1947) seem to be of a type designed for narrow-gauge timber haulage.

At first, as the train winds across the flat, open country near the River Neva, you wonder why they need such powerful engines on a light railway, but to reach Zoopark the line has to climb, and the train twists and turns for half a mile at 1 in 50, past a wooden church with a green dome and across the road into Zoopark station, with young "pioneers" standing alert with yellow flags.

Left: Parents chat on the wooden platform of Kirovskaya station while the children explore the waiting trains

The 12.22 from Ozernaya waits in Zoopark station while the northbound train enters the loop. High platforms make it easy for the young passengers to enter and leave the coaches

Train entering Zoopark station with young railwaymen guarding the road crossing

Built for timber haulage, the third locomotive of the Little October Railway boasts a Finnish-type spark arrester in addition to its many other gadgets

After a ten-minute halt you continue past back gardens to Ozernaya, where the engine is detached and turned on a triangle and the children change the boards and coach numbers in readiness for the return trip.

This part of the line has a history, for 30 years ago a real narrow-gauge railway ran along here to Oserki, but when the suburban lines were electrified it was closed.

One of the more unusual jobs on the Little October Railway is that of train announcer. Each train has a radio compartment, where programmes are picked up and relayed to loudspeakers in each carriage and on the roof outside (when in a station). The operator also announces the departure of the train, and in between times, plays gramophone records as well. On the day of my visit a little boy named Boris was running the programme, and taking his duties very seriously, too.

A journey from Kirovskaya to Ozernaya takes about 50 minutes and costs you two roubles, for which you get a brown card ticket of proper main-line pattern. The railway carries about 20,000 passengers every year (during the four months of operation), but despite this it requires a subsidy of 500,000 roubles per year. The state railways look on it as a good investment and a good idea; the children seem to think so, too. ▣

ZOE

LBSC discourses on the application of the plumber's craft to the 1¾ in. gauge passenger-hauler and begins a description of the superstructure

Continued from 21 November 1957, pages 708 to 710

WHEN building my *Caterpillar* —the 2½ in. gauge 4-12-2 which I started on an impulse 31 years ago, and completed in 43 days—I encountered a spot of bother in the pipe arrangements.

I had fitted a drop grate and ashpan, and fitted the pony king-pin to the ashpan so that the whole issue fell out when the dumping pin was removed, leaving the underside of the firebox clear and unobstructed; but as the grate area extended the full width of the trailing cradle, it was impossible to run any pipes underneath it. These would have prevented the assembly from dropping out.

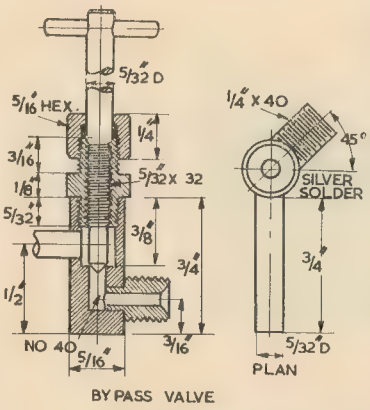
The trouble was overcome by running the pipes outside the cradle frames, and as the arrangement panned out very well I am specifying a similar layout for *Zoe*.

First take a look at what our radio and television friends would call a "schematic diagram" of the pipe connections. This shows where the pipes start and finish, and as long as they do just that at the right places the route they take is merely a matter of convenience.

I usually make a start by attaching the brackets for carrying the pipes, to the underside of the drag beam. In the present instance they are cut and bent from 16-gauge sheet steel to the given dimensions, three of the holes being drilled No 21 for 5/32 in. pipes, and the other (extreme left) tapped ¼ in. × 40 for the hand-pump union. The brackets are attached by 3/32 in. or 7 BA screws tapped into the double thickness of drag beam and fixing angle.

Copper tube is now so expensive that it doesn't do to waste an inch, so measure up all the lengths of pipe needed with a piece of wire before cutting them. I use lead filling wire about the same diameter as the pipe.

Start with the pipes that are fitted while the boiler is off the frames. Two of the reproduced drawings show how they are routed outside the cradle on their way from drag beam to destination. Run a wire from the left-hand hole in the right-hand bracket, outside the cradle, under the projecting part of the firebox, up, and over the frame through a gap filed on it wide and deep enough to take two 5/32 in. pipes (see drawing)



The bypass valve and engine buffer

then down and along to the union at the bottom of the pump valve box.

Cut the wire, straighten it out, then cut a piece of 5/32 in. thin-walled copper tube to this length plus ⅛ in. for the piece projecting beyond the bracket.

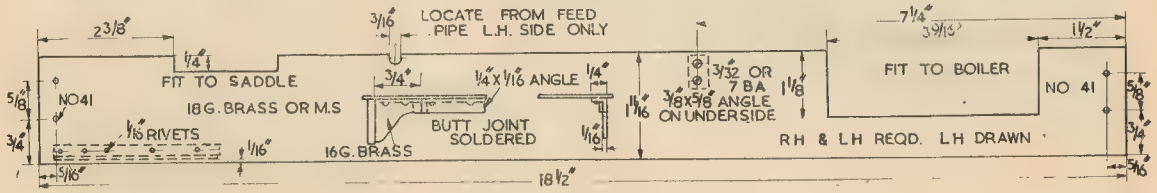
Silver solder a cone on one end, softening the whole length of pipe at the same heating, put on a ¼ in. × 40 union nut (which can be done after the cone is fitted as there is nothing on the other end of the pipe), bend the pipe to the original shape of the wire by finger pressure to avoid kinking, then erect it with the plain end through the bracket and the union nut attached to the nipple at the bottom of the pump valve box.

Tip: after silver soldering a cone on a pipe, put the lot in the pickle for a few minutes, wash well, letting water run through the pipe, then rub the pipe with a bunch of fine steel wool. The result is a joy to handle, and it looks swell on the engine. Another little thing that matters!

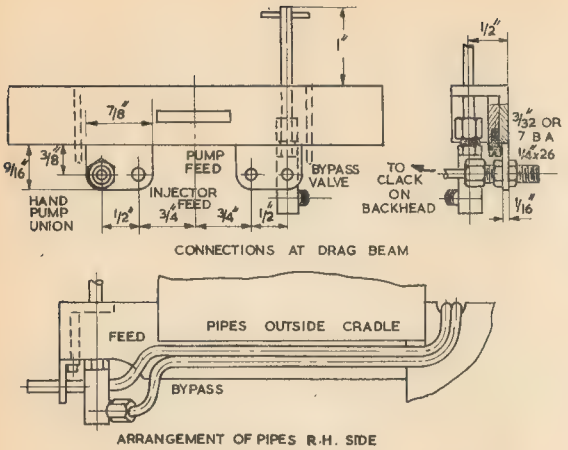
Next make the bypass valve. Chuck a piece of 5/16 in. rod, face, centre, drill to ⅝ in. depth with No 40 drill, open out and bottom to ⅜ in. depth with 7/32 in. drill and D-bit, and tap the end ¼ in. × 40. Part off at ¾ in. from the end. At 3/16 in. from the blind end drill a 5/32 in. hole and fit a ¼ in. × 40 union nipple in it.

At ¼ in. from the other end, drill a No 23 hole at the angle shown in the plan. In that fit a ¾ in. length of 5/32 in. copper tube and silver solder both joints at one go. Pickle, wash off and clean up, then fit the rest of the valve exactly as described for the injector steam valve, but make the pin to the length shown.

Drill a No 21 hole in the top of the drag beam exactly above the right-hand hole in the bracket and ½ in.



Details of the running-board



Connections at the drag beam and the arrangement of the pipes at the right-hand side of ZOE

from the edge. Take out the valve pin, put the projecting pipe through the hole in the bracket and replace pin through the hole in the beam. Measure from the union nipple at bottom to the one on top of the pump valve box, which faces backwards (says Pat), running the wire underneath the feed pipe and over the frame as shown.

Cut a piece of $\frac{1}{8}$ in. copper tube to length indicated, fit $\frac{1}{4}$ in. × 40 union nuts and cones at both ends (this time put the nuts on the pipe before silver soldering the cones) then clean, bend and erect the pipe as before. A pipe $\frac{1}{8}$ in. dia. is plenty large enough for the bypass.

Put the boiler temporarily on the frame, take the length from the front union on the pump valvebox to the right-hand clack on the boiler barrel, cut a piece of 5/32 in. copper pipe to suit, fit $\frac{1}{4}$ in. × 40 union nuts and cones at both ends, bend the pipe to shape, and attach to pump only for the time being.

Now make the hand-pump union. Chuck a piece of $\frac{3}{8}$ in. hexagon rod, face, centre deeply, turn $\frac{1}{4}$ in. length to $\frac{1}{4}$ in. dia. and screw $\frac{1}{4}$ in. × 26 (the coarser thread is better for quick coupling and disconnecting), part off at $\frac{7}{8}$ in. from the end, reverse, rechuck in a tapped bush, turn $\frac{1}{2}$ in. length to $\frac{1}{4}$ in. dia. and screw $\frac{1}{4}$ in. × 40. Centre deeply and drill through with No 40 drill.

Make a $\frac{1}{4}$ in. × 40 locknut from same size material. Screw the finer-threaded end through the tapped hole in the left-hand bracket very tightly and put on the locknut.

Take the distance from the inner end to the clack on the backhead, cut a $\frac{1}{8}$ in. pipe to suit, fit union nuts and cones on both ends and connect to the union.

The boiler can now be erected. With the smokebox saddle resting on the frames and the firebox in the cradle, it should be level and central, so all that is needed is to attach the smokebox to the saddle by three or four $\frac{1}{16}$ in. screws put through No 51 holes drilled in the side flanges of the saddle into tapped holes in the smokebox. The method of attaching the saddle to frames was shown in the drawing of that component.

At the firebox end fit an expansion clip at each side as shown. This is merely a $\frac{3}{4}$ in. length of 16-gauge copper or brass strip $\frac{1}{4}$ in. wide, with a No 41 hole drilled at each rounded-off end. Bend to the shape shown in the side view and attach to the boiler and cradle by 3/32 in. or 7 BA screws. Drill and tap the hole in the boiler so that it pierces the foundation ring only, *not* the water space.

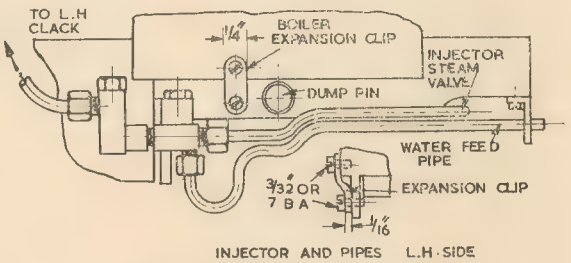
Connect up the pipes in the smokebox, as shown in the October 31 issue, sealing the interstices where they pass through the bottom with wet asbestos " putty," then smear the edge of the smokebox barrel with plumbers' jointing and press in the front, taking care to have the smokebox hinge straps horizontal.

Leave the radiused edge just showing. No further fixing is needed, and the front is readily removable if needed at any time for maintenance jobs. The pipe unions so far left loose can then be permanently connected up.

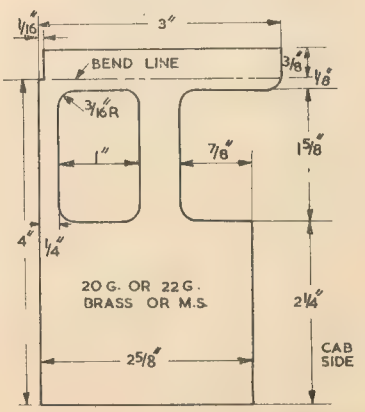
INJECTOR

One of my " standard " injectors is quite suitable for this engine, and as I have fully described the construction fairly recently, both for *Ivy Hall* and *Virginia*, there doesn't appear to be any need for going through the whole rigmarole again. If I just point out two small variations that should be made in the construction, and show how the gadget is erected, no builder should have any trouble.

When making the combining cone, first use a No 74 drill. After fitting the cone in the injector body, open out the hole with the taper reamer until a No 72 drill just goes through



Injector and pipes layout on the l.h.-side; details of the engine's cab



the throat very tightly. Similarly when making the delivery cone, start with a No 78 drill and open out to No 76; start the steam cone with a No 69 and open to 67. Ream the entry of the combining cone very slightly with the stubby reamer and turn the nozzle of the steam cone to 0.060 in. If you have no micrometer make it as near $\frac{1}{16}$ in. as you can.

Provided you have a good bright fire, this combination (67-72-76) will feed the boiler while the engine is pulling an adult passenger, without loss of pressure. If, when adjusting the water-valve, steam starts to blow from the overflow pipe before the injector picks up, there isn't enough water passing the annular space between the steam nozzle and the entrance of the combining cone to condense the steam. All that is required is to radius the entrance a little more with the stubby reamer. It is just a matter of trial and error —and, I might add, patience !

The other variation merely consists in altering the water exit from the top to the side of the check valve. Drill a 5/32 in. hole in the side of the body of the valve and silver solder a $\frac{1}{4}$ in. × 40 union nipple into it. Make a plain cap for the top, same as the clacks, giving the ball 3/64 in. lift.

Hold the injector in the position shown in the drawing, and take the measurement from the union on the injector to the union on the injector steam valve. Run the wire along the cradle as shown, then across the frame just below the level of the firebox and up to the steam valve union. Straighten the wire, cut the pipe to length indicated, fit a union nut and cone on the valve end, and a union nut and plain collar $\frac{1}{16}$ in. thick on the injector end to butt tightly against the end of the steam cone. Bend the pipe to shape and connect up.

Measure from the water union on the injector to the bracket under the drag beam, with U-bend and contour as shown, cutting the pipe $\frac{1}{2}$ in. longer to allow for the piece going through the bracket. Put the nut on before bending the pipe.

Finally take the measurement from the union nipple on the check valve to the left-hand clackbox on the boiler barrel, running the wire along level with the top of frame and turning it upwards right under the clack. Cut a length of pipe to suit as before, fit a $\frac{1}{4}$ in. × 40 union nut and cone at each end, but don't fit it permanently until the left-hand running-board is erected as this pipe goes along under the running-board instead of inside the frames.

That concludes what American locomotive mechanics (alias "nut-splitters") call the plumbing.

ENGINE BUFFERS

To make the buffer sockets, chuck a piece of $\frac{5}{8}$ in. round rod (brass or steel), face off, turn $\frac{1}{4}$ in. length to $\frac{1}{2}$ in. dia. and screw $\frac{1}{4}$ in. × 40. Part off at $\frac{9}{16}$ in. from the shoulder, reverse and rechuck in a tapped bush held in the three-jaw, turn the outside to contour shown or any other you may fancy, centre, drill through with a No 41 drill and open out to $\frac{1}{2}$ in. depth with a No 11 or $\frac{3}{16}$ in. drill.

Chuck a piece of $\frac{5}{8}$ in. steel rod, face, centre, drill No 48 for $\frac{1}{4}$ in. depth, tap 3/32 in. or 7 BA, turn $\frac{3}{8}$ in. length to a sliding fit in the socket with a roundnose tool, part off at $\frac{1}{2}$ in. from the end, reverse in the chuck and finish off the head as shown. Put a few 3/32 in. or 7 BA threads on each end of a 1 in. length of 3/32 in. silver steel, screw one end into the tapped hole in the buffer head, and assemble as shown with a spring wound up from 19-gauge tinned steel wire on the spindle inside the socket and a commercial nut on the end.

The completed buffers are just screwed tightly into the tapped holes in the beam, but may be locknutted if desired.

RUNNING-BOARDS

The running-boards or side platforms (the Brighton enginemen called them "gangways") are very simple on this locomotive as there are no splashers or other excrescences to fit. Two pieces of 18-gauge or 20-gauge sheet steel or brass are needed, each $18\frac{1}{2}$ in. long and $1\frac{13}{16}$ in. wide. See that the ends are truly square. Mark out the gaps for the smokebox saddle and firebox casing as shown, but before cutting them, try each running-board in place and check the position.

After cutting and fitting, set each in place and measure the distance between buffer and drag beams. Cut two lengths of $\frac{1}{4}$ in. × $\frac{1}{16}$ in. angle $\frac{3}{4}$ in. less than this measurement, and rivet them along the straight edge at $\frac{1}{16}$ in. away from it as shown in the drawings, butting them up against the drag beams. Use $\frac{1}{16}$ in. brass or iron rivets, and builders who prefer to see their engines adorned with an array of pimples can snap the heads above the running-boards. Personally I prefer them flush, in which case the rivets should be countersunk.

The $\frac{3}{4}$ in. gap between the end of the angle and the buffer beam is filled in by the shaped section shown. Cut it from $\frac{1}{16}$ in. sheet brass, allowing an extra $\frac{1}{4}$ in. at the top. Bend this over at right angles and rivet it to the running-board so that the shaped piece lies flush with the face of the angle. To keep it there, a small piece of brass sheet can be soldered on at the back, overlapping the joint.

The complete running-board with valance attached can then be fixed in place with two screws (countersunk or roundhead) 3/32 in. or 7 BA put through the holes in the ends into tapped holes in the tops of the beams. Additional support is provided by the expansion-link brackets on which the running-boards rest, and to prevent any sag between that point and the drag beam a piece of angle can be fitted between the driving and trailing coupled wheels, attached to both running-board and frame by 3/32 in. or 7 BA screws.

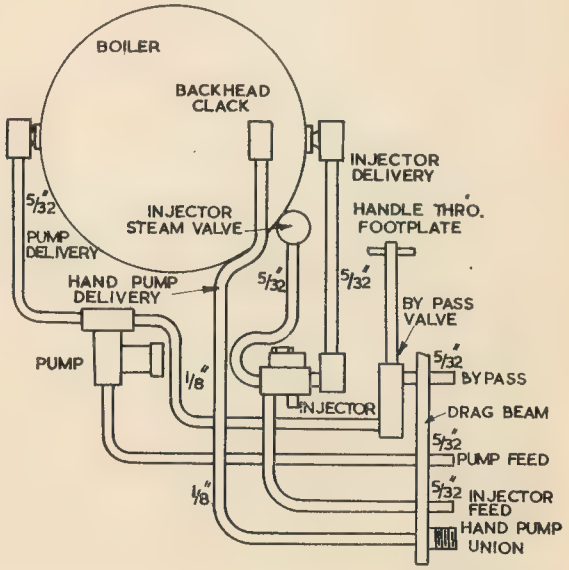


Diagram of the pipe connections

The injector delivery pipe should run close to the underside of the left-hand running-board. Nicks should be filed in the upper edge of the expansion-link bracket and the inner edge of the running-board to provide clearance for the pipe.

CAB

The outline of the cab front was shown with dimensions in the illustration of the arrangement of footplate fittings. It can be made in one piece, as the firebox is wider than the boiler barrel. Cut a cardboard template first and fit to the boiler, then mark out your piece of sheet metal from that. It doesn't matter if you spoil a dozen pieces of cardboard before getting a perfect fit, but it is an expensive job nowadays to make mistakes when cutting metal !

I made a lovely Maunsell-type cab for my Southern experimental engine, without wasting a bit, by cutting out a paper pattern and fitting it first.

The sides of the cab are cut from 20-gauge or 22-gauge sheet brass, steel, or tinplate of the same thickness. For cutting the window opening and the recessed part use either a metal-cutting fretsaw, or one of the spiral-toothed files which are used in a hack-saw frame and cut in any direction.

The bent-over strip at the top which forms the attachment for the cab roof, can be done in the bench vice. The sides of the cab are attached to the front by pieces of $\frac{1}{4}$ in. $\times$ $\frac{1}{16}$ in. angle, full length, riveted to both front and sides.

The windows are glazed with mica or Perspex, exactly as described for *Rose*. The beading around the edge of the opening or recess is fitted like *Rose's*, but the corner pillars extend right from the roof to the frame, as shown in the general arrangement drawing. The side-and-front assembly is attached to the running-boards by pieces of $\frac{1}{4}$ in. $\times$ $\frac{1}{16}$ in. angle riveted to the bottom edges of the cab sides and screwed to the running-boards. Two 3/32 in. or 7 BA screws at each side will be plenty.

The cab roof is made from a piece of the same kind of metal used for front and sides, $5\frac{1}{8}$ in. $\times$ $3\frac{1}{4}$ in. bent to the curve of the cab front, and attached to the bent-over edges of the cab sides by 8 BA screws. A rain strip of 3/32 in. half-round wire can be soldered on about $\frac{1}{4}$ in. from each side, and the back corners can be scalloped out as shown in the general arrangement drawing.

The recent illustrations showing the roof and running-board attachments of the cab for *Rose* apply equally to *Zoe*, so repetition is unnecessary.

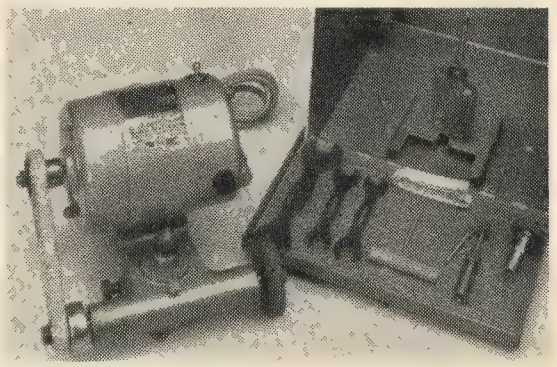
● *To be continued*

PRACTICAL PRESENTS . . .

Continued from page 762

motors with external terminal for reversing and oil-impregnated bearings. The motor is about $3\frac{1}{2}$ in. long and $1\frac{7}{8}$ in. dia. and it consumes about 1.25 to 2.0 amp. on load. Add 1s. 3d. postage to the 9s.

With the Easifind Engineers' Reference Tables you have the facts at your elbow. S. W. Simmons, of 37 Derwentwater Road, Acton, London, W3, is a designer and model engineer, and his reference tables present the essential data for lathe work in a handy folding form. The modeller, therefore, has at his workbench or drawing board a guide to screw-thread tapping and clearance drill sizes, change wheels for screwcutting, a tempering colour guide, standard wire gauges, wood screw information, and twist drill sizes—with comprehensive decimal, fractional and metric equivalents. Send 1s. 9d. (this includes postage) and cut down on your swearing in the New Year.



The Little Giant toolpost grinder with tool kit

Model engineers are not necessarily happy at the drawing board. The Quickdraw Company Ltd, of 127 Gunnersbury Avenue, London, W3, has a device to help. Packed in a folding case and priced at 75s. the Quickdraw consists of a transparent bevel-edged template cut with mathematical accuracy and calibrated in inches and millimetres with scaling in $\frac{1}{16}$ in., $\frac{1}{8}$ in. and 1/10 in. It can be used for circles as well as for the principal angles, triangles and rectangles.

Have these hints given you an idea or are you still messing up your hair ? T. Garner and Son Ltd, the tool makers, of 6-8 Primrose Hill, Barnsley, are again providing relief for the desperate through their gift tokens. Sent as Christmas cards, they allow the recipient to choose what he wants within their value, just as the owner of a book coupon chooses a book. They can be used for gifts worth 10s. or more.

Garners also have a comprehensive junior model department with the best in train sets, construction sets, steam engines and all the accessories. " Toys for Boys " is a Christmas list for modelling fathers who want to bring up their boys in the way they should go.

In all this I have said nothing about a satellite. But wait: Charles Frank offers a satellite-spotting prismatic telescope of the 8 $\times$ 50 optical specification " mostly favoured by British and Soviet scientists for satellite tracking." Originally made as a £40 telescope for aircraft spotting, the sputnik spotter may be thought astonishing value at £3 15s.

We come to two great old names so warmly associated with Christmas in our boyhood that they had the magic of jingle bells. Bassett-Lowke and Gamages were, with Stuart Turner, pillars of the first Model Engineer Exhibition fifty years ago, and through all that tremendous half-century many ME readers have looked through their catalogues with much the same relish as of old. They go well with slippers, a warm fire and a pipe of Gallaher's.▣

An excellent Christmas present is a year's subscription to MODEL ENGINEER which costs 65s. (USA and Canada $9.25) post free. Six months' subscription may also be obtained for 32s. 6d. ($4.65).

THE BOILER FOR NEWBURY

The ME gauge 1 steam locomotive

By MARTIN EVANS

The construction of the inner boiler and boiler casing is dealt with in this, the fourth article on the 4-4-0 locomotive

(Continued from 21 November 1957, pages 702 to 704)

BEGINNING with the inner barrel, this consists of a length of 1¾ in. seamless copper tube 22 or 20 s.w.g. 6⅞ in. long overall.

The first job is to square off the tube at both ends in the lathe, and it is advisable to plug the ends with wooden discs to avoid squeezing the thin tube in the chuck jaws, the outer disc having a good-size centre hole for support from the tailstock.

The holes in the top of the barrel for the safety valve and filler bushes are next drilled, and reamed 5/16 in., and then the six holes of 5/32 in. dia. for the water tubes. The three front holes are "elongated" simply by inserting a piece of 5/32 in. steel rod and forcing down to the approximate angle required.

The bushes for the water filler and safety valves are turned from gunmetal or phosphor bronze and it is advisable to make these a light press fit in the barrel in case they should come loose while being silver soldered.

Now we come to the warm part of the job! A blowlamp of one pint capacity or a small gas blowpipe will supply the heat comfortably. Use plenty of Boron compo or "Easyflo" flux around every joint and silver solder the lot at the one heat. As soon as you are satisfied that the silver solder has penetrated everywhere, remove the blowlamp, allow to cool to black and then place in your pickle bath. (This should contain dilute sulphuric acid, approximately one part of acid to 20 water.)

On my own boiler I tackled the front plate next. This was cut out from 16 s.w.g. copper sheet, well annealed, and flanged over a disc of ¼ in. thick mild steel of a diameter such that the flanged plate would not quite go into the barrel. After flanging, the plate was held in the three-jaw, with the jaws inside the flange, and the outside turned down to a tight fit in the barrel.

The two holes for main steam pipe and longitudinal stay can now be drilled 7/32 in. dia. and tapped ¼ in. × 40 t., and the plate pressed home into the barrel, to which it can now be silver soldered.

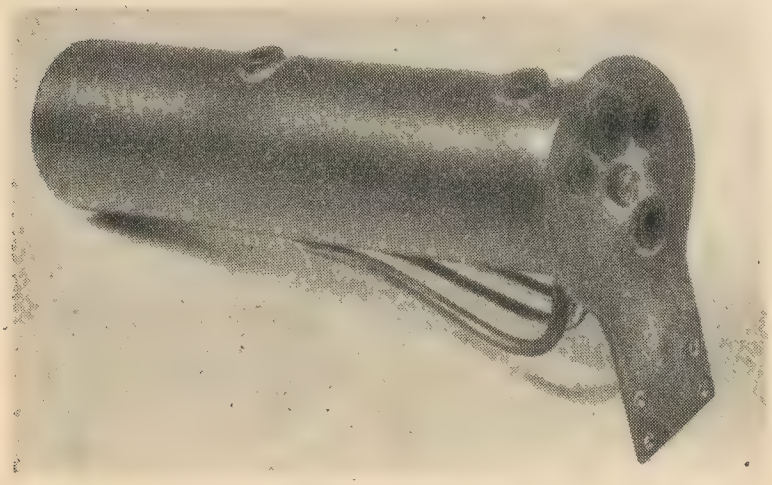
Most builders prefer to flange the backhead of this type of boiler and attach the outer casing by screws into this flange. However, this is not absolutely essential, and on my own boiler, I left the backhead flat and attached it to the outer casing by one screw into a little block fixed to the underside of the casing, at the extreme top corner, and by two screws into the closed-in portion of the wrapper (see drawings).

Having cut the backhead to shape, from 16 s.w.g. copper sheet, drilled all the holes, and pressed in the bushes, it was assembled in position and held in place by the centre stay and nipples. The silver soldering was then carried out, a generous fillet being run all round the join between barrel and backhead, and the bushes treated as before. The ends of the stay may also be run over with the silver solder, though soft solder could be used here if preferred.

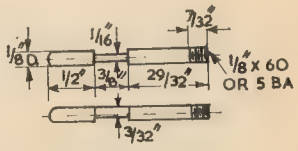
After each stage of silver soldering, the parts should, of course, be placed in the pickle bath and given a good clean up to remove scale and burnt flux, etc.

The completed inner boiler can now be tested. A water test up to 160 p.s.i. is required, followed by a test under steam to about 120 lb. All that is required is a large and reasonably accurate pressure gauge reading up to 250 p.s.i. or over, a tender hand pump, a tray or suitable vessel to hold water of about 1 in. depth, and threaded plugs to suit the various bushes.

Screw in the threaded plugs with a taste of white plumber's jointing compound, coupling up the hand pump to the check-valve bush, and mounting the pressure gauge on one of the bushes on top of the boiler. Now fill the boiler completely with



The inner boiler



VALVE SPINDLE.
2 OFF RUSTLESS STEEL

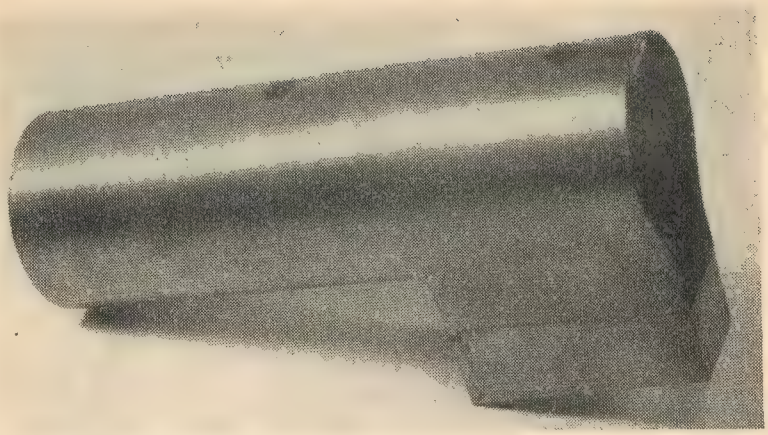
The valve spindle (see issue of November 7 for description)

water when a few strokes on the pump will bring the pressure up to the required figure.

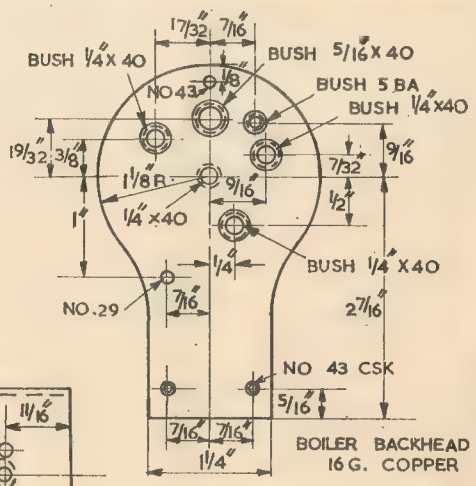
There is no danger of explosion with this water test, as water is, of course, practically incompressible and should a bulge occur, the pressure would drop immediately. If any slight leaks do show themselves, and no soft solder has been used in construction, it would be quite safe to reheat the offending spot, and re-silver solder. Use best-grade solder, plenty of flux, and scratch around the "leak" with a piece of iron wire while the solder is molten; this will ensure a sound joint when the heat is removed.

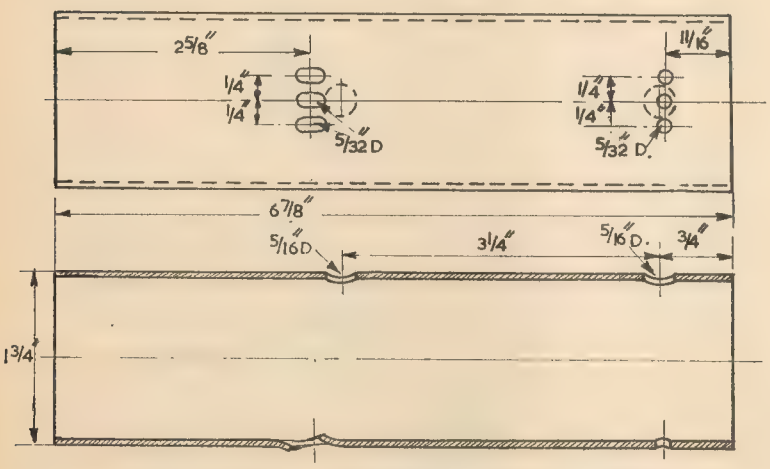
As a last resort, some Baker's fluid and a little soft solder could be put *inside* the boiler and the whole heated up to the melting point of the soft solder, a good shaking will then spread a thin coat all round the inside and should seal any slight leaks successfully. Wash out thoroughly afterwards.

The steam test is almost the same as the water test, except that the pump is no longer required, so blank off the check-valve bush, and fill the boiler only two-thirds full. Now apply

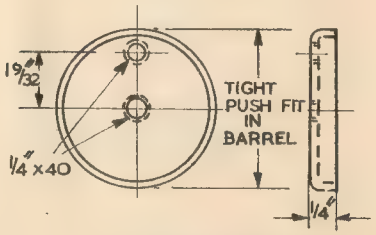


The outer boiler casing

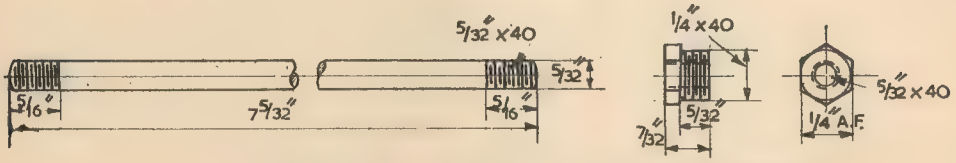




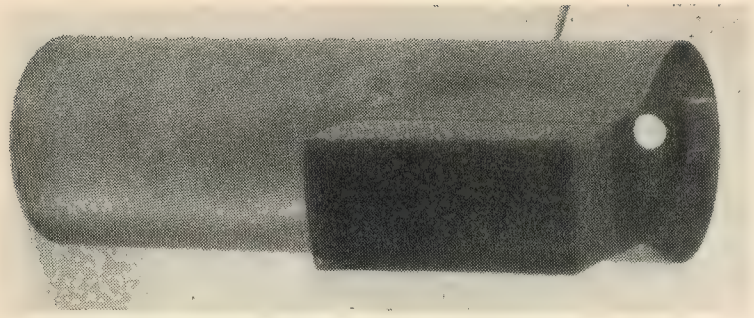
BOILER BARREL 20 G. SEAMLESS COPPER TUBE



SMOKEBOX TUBEPLATE
16 G. COPPER



LONGITUDINAL STAY & NIPPLE GUNMETAL OR P BRONZE



The outer boiler casing (underside)

sufficient heat around the water tubes (a Bunsen would do fine) to bring up to the boil and then steadily up to 120 p.s.i. The pressure should be held for a minute or two, when the source of heat can be removed; if all is well, that is one more hurdle successfully taken.

The next item is the outer casing. In my case I used 2¼ in. dia. brass tube, 20 s.w.g. thick. This is easier to work with but actually is not so efficient as steel here, as the latter does not conduct the heat away nearly so quickly and retains paint better; however, take your choice.

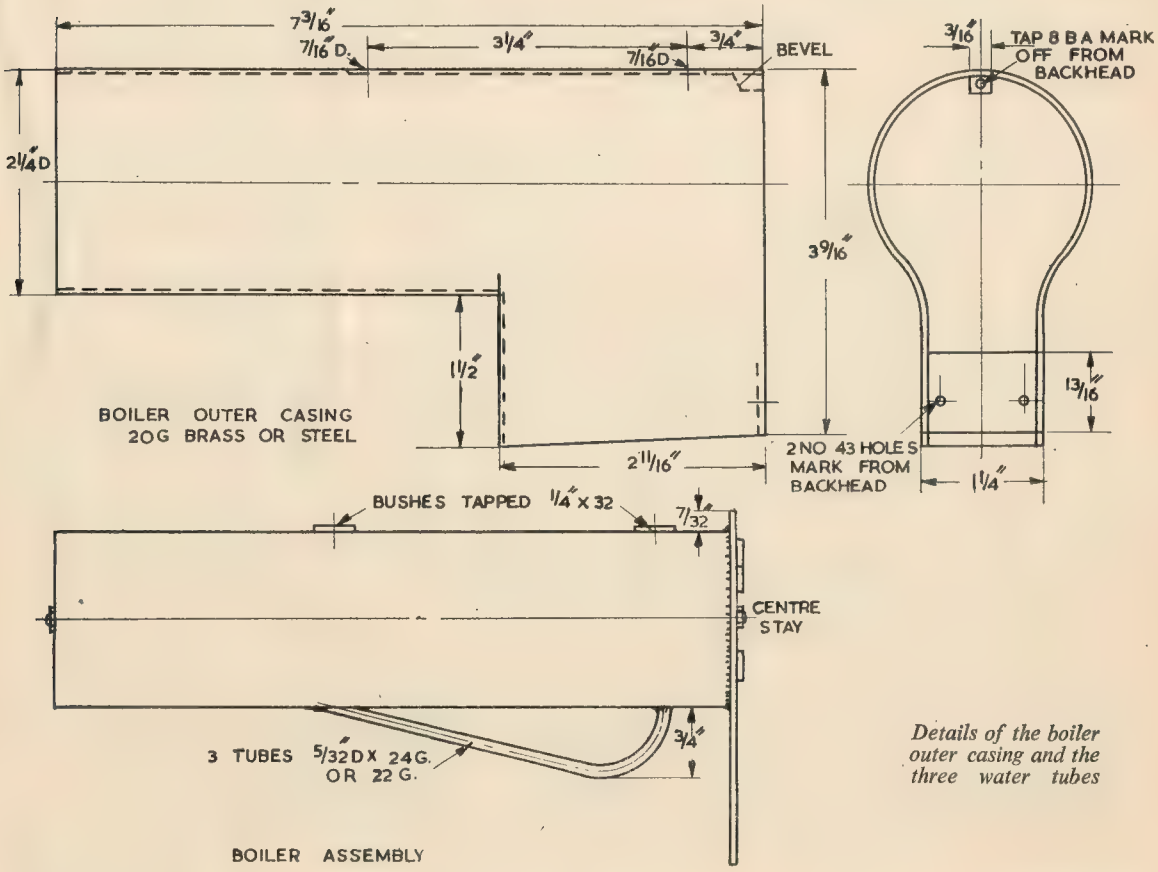
As with the inner barrel, the first job is to square off the ends in the lathe. The two holes, $\frac{7}{16}$ in. dia. to clear the filler and safety valve, can then be drilled, checking their spacing carefully from those on the barrel.

To form the firebox, a saw cut is made underneath the tube on the centre line 2 $\frac{11}{16}$ in. long, measuring from the rear edge. Another saw cut is then made, at right-angles to the first and to a depth of roughly $\frac{1}{4}$ the diameter of the tube, so that the rear end can be opened out to form the sides of the firebox. It is advisable to anneal before bending.

To obtain the depth of firebox required, two pieces of brass sheet, about 18 s.w.g., are required. One is used to form a miniature throat plate, to bring the depth of the firebox to 1½ in. at the front end (measuring from the underside of the barrel). The second is bent up to a channel section, the base being 1¼ in. wide and the sides 2 $\frac{11}{16}$ in. Both are silver soldered in place, a few 8 or 10 BA brass screws being used to hold the parts in place, and afterwards filed flush.

The small block in the top rear corner of the casing, consisting of a piece of $\frac{3}{16}$ in. square brass bar about $\frac{3}{16}$ in. long, is temporarily held in place by a 10 BA brass screw and silver soldered. The inner edge of this block should be bevelled.

● *To be continued*



Details of the boiler outer casing and the three water tubes

In the ME Workshop

EXACTUS describes a specially designed and built multi-flood unit which will be useful to all photographers

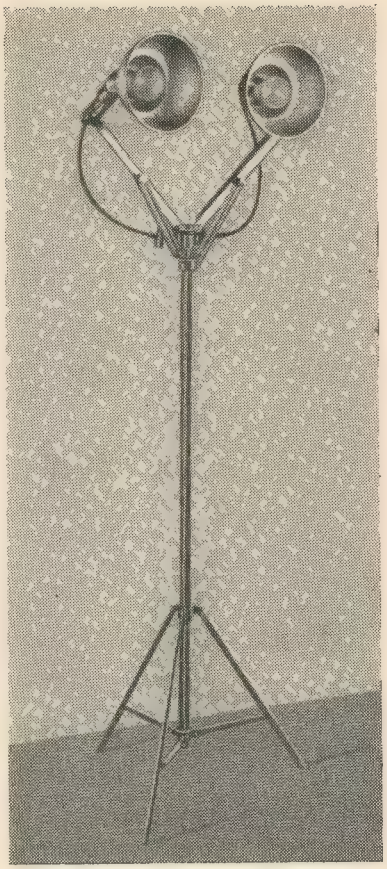


Fig. 1: *The multi-flood unit*

It is estimated that for every five members of the population, one has a camera. Model engineers find photography not only an absorbing hobby but they can make some of the equipment in the home workshop.

This interest is proved by the response to the ME Photographic competition, when the standard of entries was high. However, I doubt whether any amateur photographer is satisfied with his results, and aims to do better at his next attempt. Good lighting is essential for studio work but if commercial equipment is purchased it becomes an expensive item. Fortunately the enthusiast is not deterred by a shallow pocket.

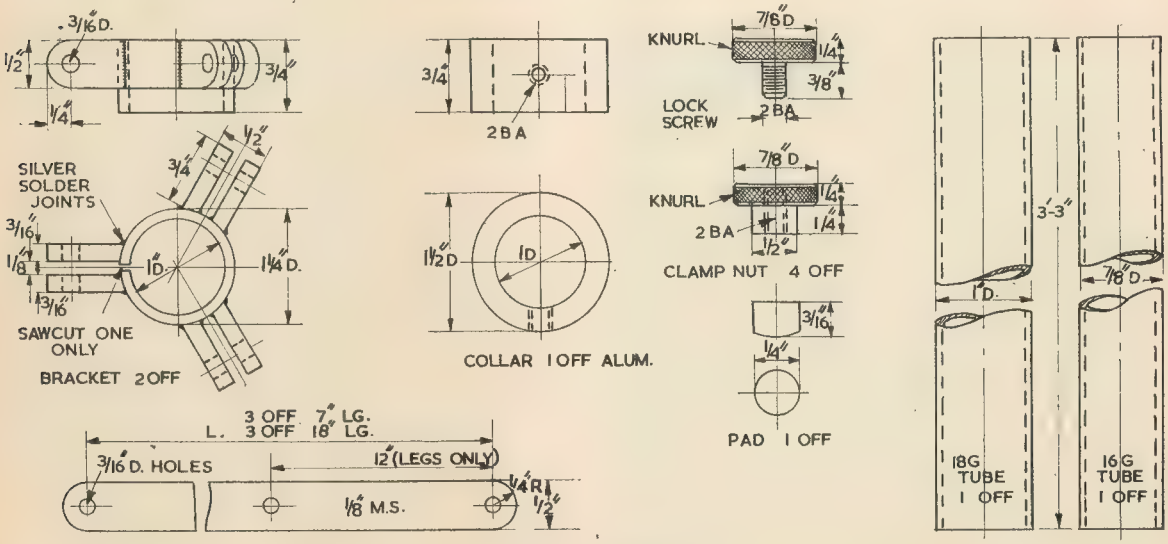
This design of flood unit is the result of trying to meet his requirements. Consideration is also given to weight and the amount of space it is likely to take up in a small workshop or cupboard when not in use.

I am not an expert photographer so I consulted our staff photographer and I am indebted to him for the benefit of his long experience in photographing models and machining operations, particularly the latter as it requires a special technique in manipulating the lighting to obtain a sharp print.

A full length view of the multi-flood unit is seen in Fig. 1. It has been on trial for the past six months in studio and workshop. It has proved a first class piece of equipment and the only modification I have made is to fit handles to the reflectors. They are too hot to handle after the bulbs have been switched on and positioning becomes difficult without handles. When it has been taken to work outside the studio—the ME Exhibition was one occasion—its lightness combined with its compactness make it no burden to transport. The weight of this lamp is just under 5 lb.

To ensure that readers are getting a first class product, the trade were invited to comment and the equipment has been highly commended.

The minimum operating height is 3 ft and the maximum 11 ft. The maximum distance between the lamps is 2 ft. These dimensions are not rigid and can be altered to suit any particular requirements. In the same way, other modifications such as extra lamps, drilling and tapping the top



Details of the folding legs

of the column for a ball and socket head can be made. These items are best left to the individual.

As to the actual cost, that also depends on what is at hand. I did not have to buy reflectors and the small fittings were fabricated from oddments; the total cost of this lamp was £2 10s. The telescopic column consists of two pieces of dural tube 39 in. long. It is not possible to purchase telescopic dural tube in the same way that brass is available so I used the following sizes: the outer tube 1 in. o.d. × 18 gauge and the inner tube $\frac{7}{8}$ in. o.d. × 16 gauge.

A collar is turned from a piece of $1\frac{1}{2}$ in. o.d. aluminium to the size given in the illustrations, and made a press fit on the top of the outer tube. When in position, drill a No 5 hole central through the bush into the tube and tap $\frac{1}{4}$ in. BSF. The locking screw is made from phosphor bronze, but brass or mild steel will do just as well. To prevent the screw from marking the inner tube, a small pad from a piece of $\frac{1}{4}$ in. dia. aluminium is placed into the tapped hole after the inner tube has been inserted, then the locking screw. At the other end of the tube there are the folding legs seen in the illustrations. The legs themselves are perfectly straightforward. Three pieces of $\frac{1}{2}$ in. × $\frac{1}{8}$ in. dural for the legs 18 in. long, and 7 in. long for the stays. Drill a $\frac{3}{16}$ in. hole $\frac{1}{4}$ in. from each end and central with the strip for the stays and one end only for the legs. The second hole in the legs is 12 in. from the first.

The fixed and sliding brackets are fabricated from brass or mild steel. Two pieces of $1\frac{1}{4}$ in. o.d. bar $\frac{3}{4}$ in. long or tube with an inside diameter of not more than $\frac{13}{16}$ in. for the body. The lugs are cut from $\frac{1}{2}$ in. square material, six pieces $\frac{7}{8}$ in. long being required. Mark off the bar or tube into three equal parts on its diameter. An easy way to do this is to place it in the three jaw chuck and place a block of wood to act as a stop between the chuck jaw and lathe bed. Draw a tool held in the tool post along the piece of material making a clear and distinct line. Now remove the block sufficiently to be able to turn the chuck so as to engage the next jaw. Draw your tool across as previously and repeat until you have three equally spaced lines. File one end of each of the square pieces so that it fits closely to your bar or tube.

Now you are ready for the first soldering job. Place each piece of bar on its end on a brick or similar object. If the bar does not sit vertically, face the end in a lathe until it does. Arrange the three lugs around equally spaced—this is where the lines come in use—and give each joint a coating of Easyflo flux. Heat to a bright red with a blowlamp and touch each joint with your stick of silver solder. Make sure that the silver solder penetrates each joint.

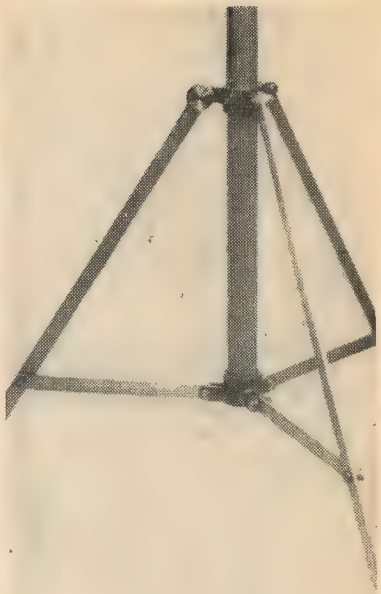
When they have cooled off and been cleaned up, grip them in the three jaw with the lugs facing outwards. Engage the lathe in a low speed and take light cuts over the ends of the lugs. When they all clean up to the same diameter they should be about $\frac{3}{4}$ in. long.

Next, bore out the centre to take the outer column. If you used tube for your body you can begin right away with your boring tool. In the case of the bar you will have to start from scratch with centre, drill, etc. One is bored out a sliding fit and the other a tight fit. When I bored mine I had an odd piece of the tube handy as a gauge.

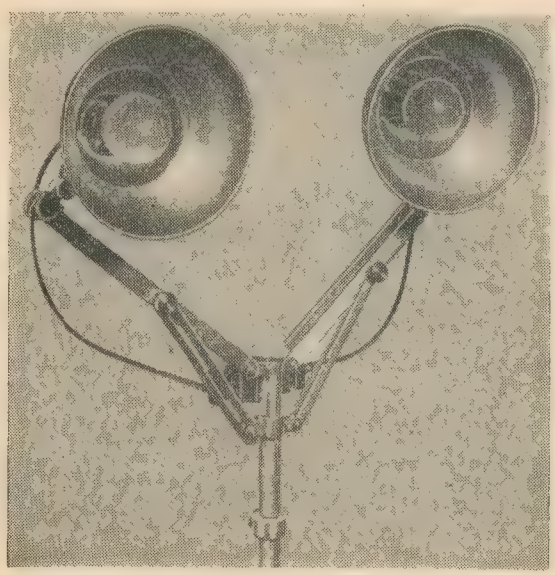
The next job is to slot the lugs. A milling machine, with $\frac{1}{8}$ in. slitting cutter, will make quick work of it. If you are not so well equipped, mark off each slot and drill a $\frac{1}{8}$ in. hole at the bottom and hacksaw down into it. Clean up the sides with a file until the strips fit freely. It will be obvious that these slots must be in line with each other if the legs are to operate smoothly, so eliminate any error before attempting to mill or cut the slots. Fit both brackets over a common mandrel. Line up the lugs and clamp together with a toolmaker's clamp. After the first slot has been cut, insert a piece of strip to make sure the two brackets don't move.

To enable the top bracket—the sliding one—to clamp the column a slot is cut through with a hacksaw down the middle of one of the lugs. This finishes the brackets apart from radiusing the corners and making them look respectable. The legs are assembled with 2 BA bolts and nuts. The clamping nut is made from a piece of $\frac{7}{8}$ in. dia. rod. There are four on the job altogether so you might as well make them all at one go and put three of them by until needed.

● *To be concluded next week*



Top, Fig. 2: The folding legs assembly



Left, Fig. 3: Close-up view of the top

To beg, borrow or buy . . .

Let us go back in time to a winter's night in the year 1868. *The London river and the East End Docks were hidden in wet, grey fog. The gas lamps in the squalid, narrow streets of Wapping cast pale, watery nimbus like globes of St Elmo's fire in the gloom. Tall, windowless buildings of dingy brick towered over the mean houses; the cranes of their upper storeys sticking out dismally like gibbets above the street. The siren of a steam tug, hooting as she nosed her way up the Blackwall Reach, was the only sound to break the heavy silence of the fog-bound waterside. Beyond the tall, black warehouses with their sinister gallows reaching over the deserted streets, a forest of masts in Shadwell Basin was faintly visible through the murk. . . .*

It was an eerie night, a night when ghosts walk. . . .

Barenetha Rock, Stanley Rogers (W. H. Allen, 18s.).

It is from *Barenetha Rock* that I have quoted. Ever since Dickens, whose Christmas Tales will be read again this winter by the Russian moonrakers no less eagerly than by the Americans in their skyscraper cities, the London fog and the murk of watersides have been essential to our Christmas comfort. So draw your chairs nearer to the fire. The wind blows cold round Wapping Old Stairs and colder far on the wintry Atlantic, but here is Captain Stanley Rogers with a book to make us feel richly cosy while the windows rattle and the trees outside creak in their ancient joints.

By any standards *Barenetha Rock* is a feat. One opens it expecting fiction and soon finds oneself deep in fact. This is a true drama of the sea, the story of a clipper captain, and a legendary phantom rock. Captain William Wallace Urquhart was born in Essex, Connecticut, on 28 June 1838, went to sea at sixteen, commanded the ocean packet passenger ship *American Eagle* at twenty-three, and as captain of the *Trimountain* (the original name of Boston) had a happy knack of appearing on the horizon just when help was needed.

One can only congratulate Captain Rogers on discovering a story that would have enthralled Conrad and on telling it with a masterly understanding of atmosphere and background. His book reads like an exciting novel; but a novel furnished with an index, appendix and illustrations—one of them a chart that brings out the Jim Hawkins in all of us. I now want to get hold of everything that Captain Rogers has written, his children's books included.

Ghosts on the Sea-Line, A. A. Hurst (Cassell, 30s.).

"If this book is a lament I make no apology," says A. A. Hurst. None is needed: the tall proud ships have gone with their beauty and their evil, too, and our memories of them are inevitably elegiac. Distance lends enchantment; few of us who enjoy

South Street, New York, in the 1850s (*From "Barenetha Rock"*)

To beg, borrow or buy . . .

reading of these lovely craft with their white sails crowding would have liked to have sailed in them as an ordinary member of the crew during the years of their glory. The life was rough, tough, dirty and sometimes bestial, as the author of *Barenetha Rock* took pains to emphasise.

It is, indeed, interesting to compare these two books. Mr Hurst gives us a crow's-nest view of the last great age of sail, but if his book—illustrated with pictures that asked to be framed—is panoramic in its scope it is also so intimate and detailed that we can turn to it for almost anything we are likely to want. Writing with a love that springs from first-hand knowledge, he weaves biography and history to create a fabric coloured with the natural romance of sail. Each long chapter carries at its masthead a quotation from the poets, with John Masefield the obvious favourite.

But do not suppose that *Ghosts on the Sea-Line* is all white sails in the sunset. The poetry for Mr Hurst shines out from the practical facts as well as from the romance and nostalgia.

> "The iron hull, oddly enough, was much lighter than a wooden hull in vessels of a comparable tonnage, and also gave a greater volume for cargo in the hold. As to their relative performances, it is certain that the wooden ship would run away from a comparable iron one in light winds, but could not carry sail like iron ships in hard weather, and it was not an uncommon thing for an iron or steel ship to pass a wooden one in hard weather, and for the wooden ship to come up into the lead again after the weather had moderated. In the first phase of iron shipbuilding there was a tendency for ships—particularly the clippers—to be over-sparred and there was a spate of dismastings, but steel, being so much lighter, automatically overcame this fault, and it was noteworthy that a number of vessels of both iron and steel construction sailed much better after their rigging plans had been reduced, as the reduction in weight aloft more than compensated for the loss of sail area."

All in all, this book will be enjoyed as a sailor's psalm to the beauty that blossomed in the wind:

They mark our passage as a race of men,
Earth will not see such ships as those agen.

Isambard Kingdom Brunel, L. T. C. Rolt (Longmans, Green, 25s.).

This is not so much a review as a reminder. Mr Rolt's biography of Isambard Kingdom Brunel has been handsomely received by the general press and no one who is interested in Brunel himself, in ships or railways, or in the tremendous progress of civil engineering should let the year pass without reading it.

For the biography of a nineteenth-century engineer to catch the attention of critics and public is, in these days, unusual. The blame lies, in part, with the earlier biographers whose attitude of reverence, expressed in remote and wordy prose, was ponderously boring to later generations. After all, Lytton Strachey has lived and written and died; the plaster busts have been shattered and the Great Victorians must be brought to us as living human beings if they are to have any life for us at all.

Mr Rolt has done this with Brunel. Seen in the round, the giant stands before us as more of a giant than ever.

The gift of being near ships, of seeing each day
A city of ships with great ships under weigh;
The great street paved with water, filled with shipping
And all the world's flags flying and seagulls dipping.
John Masefield.

It is typical of Mr Rolt's modern approach that in his dedication of the book, to Brunel himself, he quotes W. B. Yeats, for the biographer of today must look under the surface, to the springs of character, and his search is never so rewarding as when he finds there the impulses of a poet. It is as a poet, an artist, that Isambard Kingdom Brunel emerges from these rich pages. Who, with a name like that, could have been otherwise?

> "He has his statue in marble; every boy's railway book refers to him; we may have seen his name engraved upon that great bridge at Saltash which is the gateway to Cornwall; we may know of him as the over-ambitious author of the broad gauge or of that premature giant among ships, the *Great Eastern*; perhaps we only remember him by virtue of the evocative overtones of that remarkable name, a name in which all the pride and self-confidence of an era seems to ring out like a brazen challenge. But what sort of a man was this Brunel?"

Mr Rolt's answer is a book that will be cherished, written with a craftsmanship worthy of a great engineer and beautifully illustrated, printed and bound. I see it as an encouraging sign. Go on writing, Mr Rolt: when we have more biographies like *Isambard Kingdom Brunel* the engineers who made the world we live in will at last have received their due.

Materials of Civil Engineering, J. P. M. Pannell (Hutchinson Scientific and Technical, 30s.).

We can only marvel the more at the achievements of men like Brunel and Telford when we realise the extent to which they were governed by the limits of their tools and materials. Fifty years ago Jules Verne had two men and two dogs travelling round the moon. But no one at that time could have sent a man or a dog into space because suitable alloys and fuels were not obtainable. Our present age is as much the age of technology as it is of science; one fertilises the other.

With generous help from illustrations, J. P. M. Pannell describes the resources from which the civil engineer can draw. The author, who is engineer to the Southampton Harbour Board, served his apprenticeship in mechanical engineering and it is his wide experience of materials over a full forty years which gives value to this book.

One of the engineer's first and most important tasks is the selection of the actual stuff with which the work will be done, yet the young man from college frequently discovers himself worst equipped at precisely this point. Mr Pannell bridges the gap between the academic and the practical, and the young civil engineer who reads his book today is likely to keep it by him for many years to come.

Flight Today, J. L. Nayler and E. Ower (Oxford University Press, 12s. 6d.).

Two Fellows of the Royal Aeronautical Society, J. L. Nayler and E. Ower, are the authors of *Flight Today*, which was first published in 1936. This new edition in the OUP's admirable Pageant of Progress series has been almost entirely re-

written and is as up to date as one could reasonably expect any book on flight to be in these days when we never know what may be whizzing high above us.

The rush to keep pace with events leads to the production of hastily-written books whose fate as a rule is to die with the news. Here is everything essential to the layman's understanding of aircraft and flying. Although written by experts, *Flight Today* can be read with ease and pleasure by anybody. There is no one who can fail to learn something from its pages.

Oddly interesting facts occur in almost every paragraph. Did you know, for instance, that the Wright Brothers' aircraft gave only 16 h.p. and weighed 180 lb., or more than 11 lb. for each horse power, when most modern aero-engines of the same weight would develop 150 h.p. or more?

Over twenty illustrations complete a book which should appeal to all ages from the teens upwards.

Tourist Trophy, Richard Hough (Hutchinson, 25s.).

WISELY, the authorities in England have never permitted the public roads to be closed for motor-car racing. For the racing enthusiasts, if not for the public, this was an annoying limitation in the early days. There they were, all dressed up and nowhere to go—until it occurred to someone that the House of Keys is not subject in most of its laws to the Houses of Parliament.

The Lieutenant-Governor of the Isle of Man at that time was Lord Raglan, son of the well-overcoated general who lost a hand at Waterloo and the Light Brigade in the Crimea. On his initiative the island roads were opened to the Tourist Trophy Race of the Royal Automobile Club. At first the railway system was disorganised and the harvest upset, but the race helped the economy of an island which was little known to the outside world except through the turgid novels of Hall Caine. The cars brought visitors and the visitors brought money.

As the first TT was held in 1905 Richard Hough's *Tourist Trophy* covers pretty well the whole history of motoring competition in England. Maps and statistics make the book useful for reference but the reader will value it most for its close-up views of the races and the men. "George, fortified by a dozen oysters during his pit stop, was going like the wind"; and Mr Hough's prose goes like the wind, too. This is a book which pulses with enthusiasm on all six cylinders.

The Air, Edgar B. Schieldrop (Hutchinson, 30s.).

DR Schieldrop, Professor of Applied Mathematics at Oslo, is writing the whole history of mechanical transport in four handsomely illustrated volumes. We had *The Railway* in time for last Christmas, and now we have *The Air*. I hope that *The Sea* and *The Highway* will follow at the same time of year, for these books are agreeable Christmas reading.

A study of flight from swan-maiden to satellite might easily be sketchy or stodgy; Dr Schieldrop's is neither. What impresses us is not only his range of knowledge but his individual use of it. Again and again he brings a scene alive with a detail. Writing with the gaiety, humour and thoughtfulness of a philosopher, he assesses the significance of what he describes. The mechanical alone is not enough; an invention or discovery is, for good or ill, an event in history.

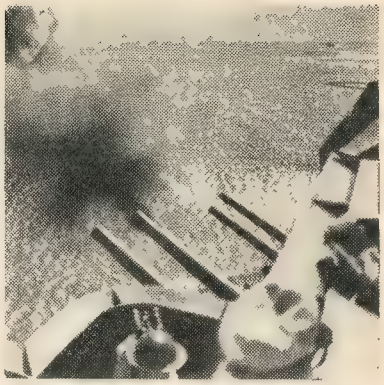
Summing up in the accent of Wells—the Wells of the space-rocket in *Things To Come*—he declares that the mind of man must be for ever seeking even though what it finds may be dangerous: "The animal, the earthworm, the mackerel and the cow stopped in time. It is possible that they are happy. Man is spirit and imagination, seeking, active and creative. Perhaps he is not so happy, but he can never stop and still continue to be man."

With this text for Christmas 1957 I leave you to the earthbound peace of your firesides. J.M.

HMS Warspite, Captain S. W. Roskill, RN (Collins, 25s.).

IT was in the great anchorage in the Clyde that I first saw HMS *Warspite*. She was lying with a great assembly of ships and, at once, she was different. She still had her tropical grey paint and, in contrast to the sombre battleship grey of the remainder of the fleet, she seemed to absorb all the sunlight in the harbour.

It was many months later that I first climbed on board to report for duty—at Malta in 1943, when my own ship had been torpedoed. I joined reluctantly because, like most men who had served in smaller ships, I had no wish to take part in the "bull" which was inherent in most battleships—the biggest of RN ships.



HMS WARSPITE *bombarding Reggio, in the toe of Italy, at the opening of the Italian offensive*

But almost at once I liked the ship. She had an independence and a sturdiness which affected the men who served in her. She was a grand old ship, though not always predictable, as Admiral of the Fleet Lord Cunningham points out in a foreword to Captain Roskill's book:

"All ships have personalities, but *Warspite's* was highly original. She always had a touch of feminine capriciousness about her. She was liable to take a dislike to her consorts and collide with them; she was not unknown to leave her proper element to taste the feeling of the land. She was always something of an anxiety to those who commanded her; for she had a will of her own, and they never knew when she would take it into her head to do something quite uncalled for and unexpected, such as turning a complete circle on her own. She learnt that embarrassing manoeuvre at Jutland, and she never forgot it. Her stubborn, wilful, lovable character never changed, and right to the end her wheel had to be handled with caution lest her incalculable sense of humour should be aroused. At the last, when her life was almost extinct, she showed a final flicker of those same qualities when she threw off her tugs and preferred the Cornish coast to a ship-breaker's yard. And who can blame her?"

Warspite was seventh of that name. The first was a galleon, launched in 1596. She was soon in action and was commanded by Sir Walter Raleigh in the attack on the naval base at Cadiz. That was the first of her battles and successive ships of the same name were seldom far from the thick of things.

It is a fascinating story and Captain Roskill, an eminent naval historian, tells it with authority and sympathy. ▣ D.K.

POSTBAG

The Editor welcomes letters for these columns, but they must be brief. Photographs are invited which illustrate points of interest raised by the writer

FROM MALAYA . . .

SIR,—In this country such luxuries as bright mild steel are unobtainable, thus a lot of laborious facing of "building material" has to be carried out.

The enclosed photographs illustrate a simple and very effective method of getting the self-act feed from the leadscrew hand wheel to the cross slide. The wooden pulley is a push fit on the boss and stands proud so that it is gripped by the ball handle. What appears to be thread is a length of fishing line which has adequate strength for the purpose and the beauty of the arrangement is that by winding a given number of turns on the pulley the lathe can be set to surface any required area. When the last turn winds off, operations cease and only electricity is wasted.

The ML7 with gearbox gives a very fine feed of two thou per rev and the pulley, being slightly larger than the hand wheel, transmits a surface feed of 1⅛ thou per rev. This rate gives a polishing cut on anything that will swing in the gap and the operator can go away and have a cup of tea between cuts !

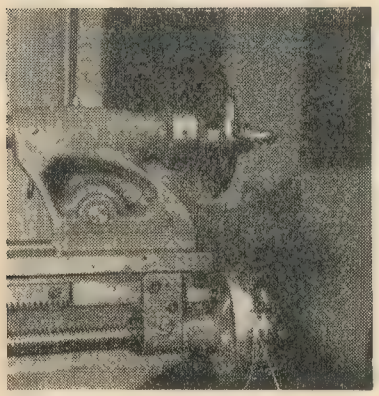
My pictures show the set-up in action facing a length of 2 in. × 2 in. mild steel for the rear tool post as designed by Martin Cleeve [ME 20 September 1956.] So far as I am concerned the idea is original and, as none of my engineering friends confess to having seen anything similar, it may be of interest to some of your readers.

I cannot yet claim to be a model engineer, but am the proud possessor of an ML8 and ML7. The former has the circular saw and compound slide attachments, each complete as a unit with its quick nut, tube support and saddle. I have modified the tubular bed by continuing the top slit as shown, and the result of this is that the compound slide, circular saw base, hand rest and tailstock can be slid on and off in a matter of seconds simply by detaching the respective clamp levers.

I argued that the bed would not lose rigidity as the separated halves would be held together by the vice-like grip of the tailstock and/or other attachments, and the modified lathe has been in use on very heavy work for two years without the slightest sign of trouble.

Amateurs with workshops are few and far between in Malaya. If this letter is published who knows it may sow a seed which will start the first Society of Model Engineers here !

Kuala Lumpur, Malaya. F. A. MERRY.



F. A. Merry's effective method of getting the self-act feed from the leadscrew hand wheel to the cross slide

VALVE GEAR

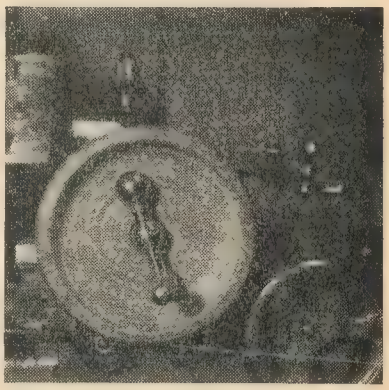
SIR,—Concerning the query from F.N.M., of Upminster, [Readers' Queries, September 26], regarding "Allen" valve gear, first, this is *not* Allen but Allan, being invented by Alexander Allan *circa* 1859.

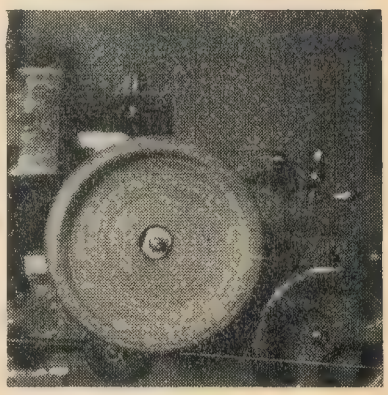
In the July 30 issue of ME for 1908 is an article by the late Henry Muncaster which deals shortly with this gear and comments on its excellent features and on its main characteristics.

In the issue 10 August 1911 is a practical design by the same author for an Allan gear for a model winding engine having 1½ in. stroke cylinders.

In the issue for 9 December 1909 Muncaster gives the geometrical construction for this gear, as well as an actual example of the gear. In the sixth edition of *Locomotive Management* will be found dimensioned detail drawings of the gear (I believe as applied to the old LNWR 2-4-0 engines).

From the point of view of accurate steam distribution this gear is almost certainly the best of the link motions, while for models with low pitched boilers it has an advantage over the





Stephenson (Howe) gear inasmuch as it requires less headroom.

A valuable feature in full-size practice was that it was practically self balancing and much easier to operate than was the Stephenson gear in which the whole of the weight of the link and part of that of both eccentric rods had to be moved by the driver. For this reason it was frequently used both on winding engines and reversing rolling mill engines.

In certain quarters it has been derided because it incorporates a straight link; the deriders seem congenitally incapable of assimilating the fact that, due to the interaction of the arcs described by the ends of the valve rod and the link, a straight link is the only possible form.

A knowledge of the more elementary features of simple geometry is, to put it mildly, of some assistance when studying valve gears, and its possession in no way inhibits its possessor from being a first class craftsman and a practical man.

It is possible that F.N.M. may not have access to the various sources of information I have mentioned, in which case if he cares to get in touch with me through the Editor I should be only too happy to offer him any assistance within my power.

Rustington, Sussex. K. N. HARRIS.

IN THE VELDT

SIR,—I have been a reader of your magazine for some time now, and always look forward to receiving it.

As most of your readers are interested in all types of ancient engines (I, personally, have just completed a beam engine) I enclose a photograph of an old 6 h.p. Ruston Proctor steam engine No 51136, made in Lincoln.

I came across this engine rusting out in the veldt at the foot of the Pirie Mountains. I was unable to find the owner, but it was evidently used for timber cutting in the good old days. Perhaps the makers, if they still exist, could trace whom they originally sold it to.

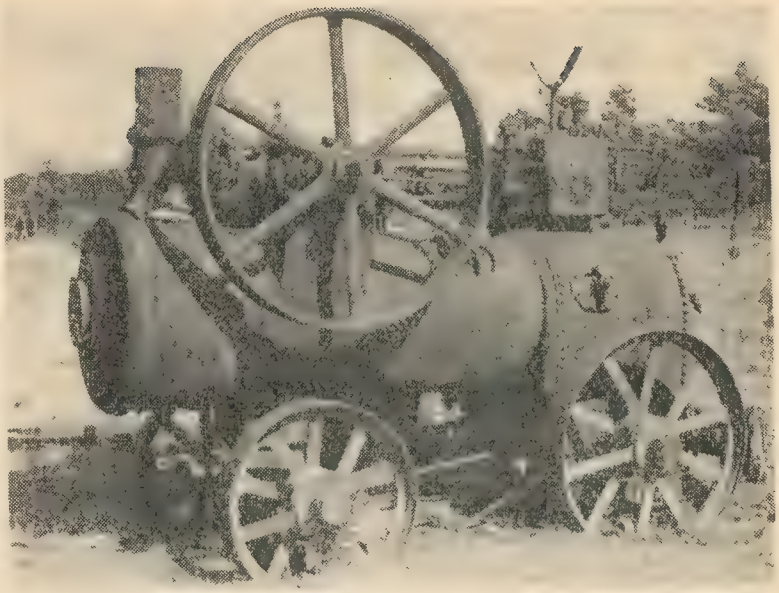
Model engineering is not very easy in this part of the world, owing to supply difficulties. I even had to write to England for a No 7 BA tap !

S. B. GIMINGHAM.

King William's Town,
South Africa.

THOSE DEFINITIONS

SIR,—I am glad to see the start of the series "Power for Model Boats." This is a subject of great interest and readers, be they beginners or experts, are sure to benefit from Mr Westbury's knowledge and experience.



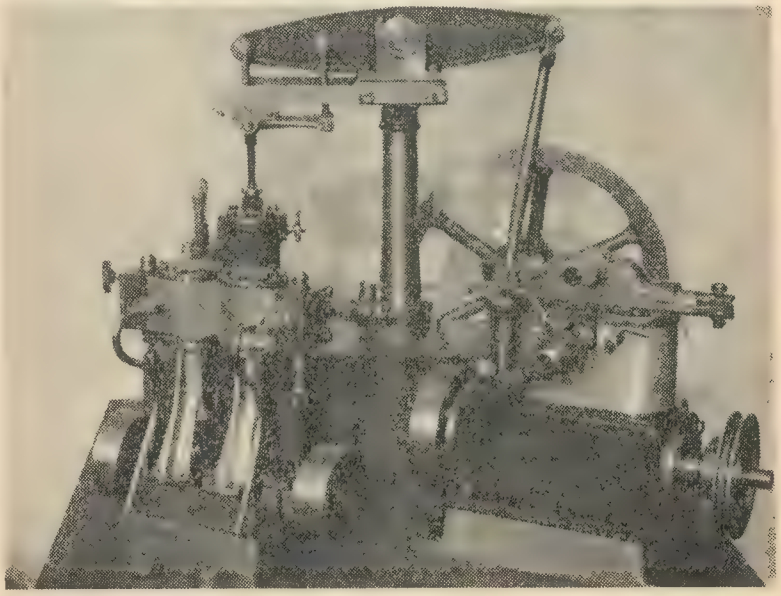
The 6 h.p. Ruston Proctor steam engine No 51136, *made in Lincoln*

However, I feel I must point out what seems to be a mis-statement.

It is asserted that the unit of force is the foot-pound, and that one foot-pound is the amount of *force* required to lift 1 lb. through 1 ft. Surely the foot-pound is the unit of *work*, and one foot-pound is the amount of *work* done in lifting 1 lb. 1 ft, i.e. unit force acting through unit distance, the unit of force here being the pound. (Not so precise a unit as the dyne or the Newton, but good enough for engineering practice.)

The reasoning from foot-pounds to horsepower is correct, but the use of the word "force" where "work" is meant vitiates the otherwise good definition of energy, and surely it would be better to say: "energy is a work-time equation" or a "force-distance-time equation."

I put this forward, since (a) I think it very important to get these funda-



Stuart Turner models built by Mr Gimingham

POSTBAG . . .

mentals right, and (b) it is most unusual for anything in MODEL ENGINEER to be inaccurate.

I couldn't possibly agree more with Mr Westbury's remarks, simple and to the point, about scale speed.

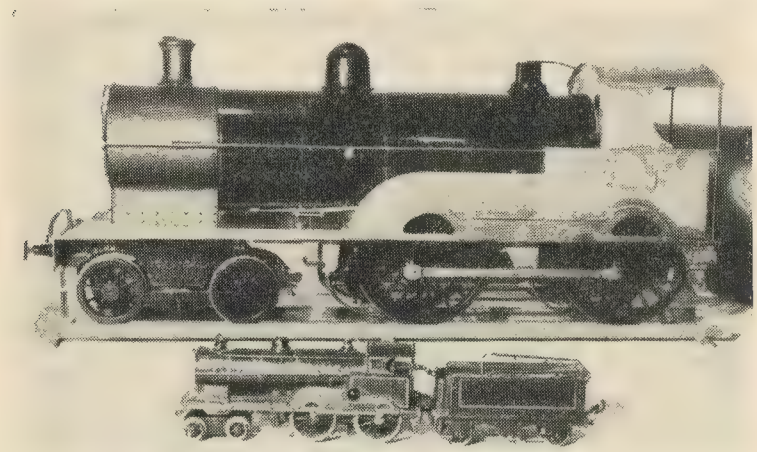
In conclusion, thanks to ME for a never failing source of interest, enjoyment and instruction.

Glasgow, E1. JAMES J. BROWN.

FOUR YEARS' WORK

SIR,—Following LBSC's recent reference in MODEL ENGINEER to my 5 in. gauge *George V*, I thought you may care to see the enclosed photograph. This engine has the general exterior appearance of the prototype. The boiler, cylinders and valve gear are taken from the published drawings for the *Maid of Kent*.

The photograph shows four years' work. The tender is at present being constructed, and I estimate the whole job will be complete in another two years. The gauge O clockwork



G. M. Cashmore's 1 in. gauge GEORGE V *together with the gauge O clockwork version*

George V in the foreground was given to me at the age of four years. It brought me many happy hours in my childhood and it is for this reason I decided to build a 1 in. scale locomotive of the same class.

London, NW1. G. M. CASHMORE.

MICROMETER ACCURACY

SIR,—I wish to thank Mr D. W. E. Kyle for offering to test the accuracy (or shall I say, inaccuracy) of my 2 in. bench micrometer [Postbag, October 31].

He, which other critics have overlooked, has observed that its use is not so much for getting an accurate dimension, but to obtain a mating part by a movement of, say, 0.001 in. or 0.002 in. up or down.

In my article I pointed out that it is useful for setting callipers, etc. I also advised that a 40 t.p.i. bar would, probably, prove more accurate, especially if the thread were cut in the lathe and finally finished with a die.

I have checked the instrument by a 1 in. high class micrometer with the following results:

1 in. micrometer	2 in. bench micrometer	
0.250	0.250	
0.500	0.501	
0.750	0.749	
1.000	0.999	
1.250	1.250	by vernier
1.500	1.449	calliper
1.750	1.751	do.
2.000	2.002	do.

I think that the original criticism was due to the fact that a subtitle, "An instrument for close-tolerance work," was added.

Colchester, Essex. J. E. FOSTER.

LITTLE JOHN LATHE

SIR,—I was interested in the recent remarks by A. J. S. Baker concerning the Little John lathe [Postbag, November 7].

I recently bought secondhand one of the earlier models of the Little John. Examination showed that it had previously been labouring under what must have been (to quote Mr Baker) "the most appalling conditions of misuse." The lathe had been used in an industrial concern by an operator who had not the slightest regard for the machine.

However, most of the damage showed itself to be repairable. The hardened bedways, in spite of the rough treatment, still appeared as good as new. I am giving the lathe a thorough overhaul at the moment.

There are some criticisms of the design of my model worthy of note. First, the absence of a clutch is most noticeable for several reasons. Quick stopping of the chuck is impossible; should the lathe be left stationary in fast or medium speed the motor becomes over-loaded on starting due to the very high inertia load (I have blown 10 amp fuses in this way); finally, since all starting and stopping has to be done with the motor switch, the internal centrifugal switch of the motor receives a great deal of wear.

I have considered the fitting of a clutch to the lathe but the design of the infinitely variable drive does not lend itself readily to the incorporation of a clutch.

My biggest criticism is that the relative pitches of the cross and longitudinal power traverses, with a given gear train setting, differ greatly (the latter feed is some twenty times the pitch of the other if I remember correctly). Even the fitting of a quick-change gearbox would not I fear give a range of feeds wide enough to avoid the change of gear trains necessary when changing from cross to longitudinal feed or vice versa.

The only solution I can think of is the fitting of an extra reduction gear train between the traverse shaft and the traverse pinion on the apron. In order to accommodate this in the limited apron space an internal epicylic gear would have to be devised together with a redesigned apron to house it.

Some of these faults have probably been rectified in later models than mine. The latest models have an improved appearance in addition to other alterations.

The Little John is a remarkable lathe. It is most original in design especially with regard to the infinitely variable gear and form of hardened bed ways. What a pleasure it is to be able to speed up the lathe on facing cuts without stopping!

With the acquisition of the Little John I hope to relieve my old pre-war 3½ in. lathe of the heavier work experienced in my workshop such as turning large cast-iron locomotive wheels.

The mandrel is very praiseworthy with its 1 3/32 in. hollow bore, No 4 MT and 1¾ in. dia. square threaded nose with double register.

West Bromwich, Staffs, G. BROWN.

CLUB NEWS

ALTHOUGH television seems to have affected the general attendance at Ramsgate and District Model Club there is no slackening of activity in the club's plans for the immediate future. Both the multi-gauge track and the OO layout are being extended.

The "growing competition of television" was emphasised by J. Hoyland, the retiring chairman, in his report to the annual meeting at the headquarters in Effingham Street, Ramsgate.

Treasurer W. C. Martin reported a sound financial position. Ten adults and five juniors had joined during the year.

Instructional courses

The meeting also heard several suggestions for future programmes. It was generally agreed that the 50 ft of multi-gauge railway track should be completed so that the *Ajax* passenger-carrying locomotive could be run. A series of short instructional courses on club nights and extensions to the OO layout were other items approved for the future programme.

President E. Church (14 St Mildred's Avenue, Ramsgate) was re-elected secretary and was succeeded as president by W. Skuse, with Mr Martin continuing as treasurer. Prizes won in the annual competitions were distributed by Mrs Hoyland.

All readers of this page are sure of a welcome on Wednesday or Friday evenings when the club opens from 7.30 to 9.30. The Effingham Street premises will be found at the rear of the fire station.

ACROSS THE SEA . . .

Visits to railway installations and the Belfast Transport Museum completed the Irish tour of the **Railway Enthusiasts' Club.** In the previous week the club had organised a special train over the Cavan and Leitrim Light Railway; a coach attached to the morning goods from Sligo to Enniskillen on the Sligo, Enniskillen and Northern Counties line; a special journey by the Fintona horse tram; and a special railcar tour of the entire County Donegal railway system.

Arrangements are already being made for a two-day visit to the Dublin area at the end of next March. "I will arise and go now, and go to Innisfree. . . ."

Edited by
THE CLUBMAN

HAPPY HUDDERSFIELD

"Many new friendships have been made," writes secretary C. M. Robinson of **Huddersfield SME** at the end of a successful year.

New friends and old will meet at Heywood's Cafe in Huddersfield on December 12 for the annual dinner of the Society and for the distribution of prizes by Mrs H. Armitage, the president's wife. Tickets, which cost 7s. 6d., can be had from Mr Robinson at 57 Blackhouse Road, Fartown, Huddersfield.

ADAMS LOCO TALK

Bert Brock of the **Eltham and District LS** is gradually progressing with his 5 in. gauge Adams locomotive, and tonight he will talk about it at the Beehive. Members present at the last meeting enjoyed G. Sheed's talk on his 3½ in. *Petrolea*, described to me by secretary F. H. Bradford (19 South Park Crescent, London, SE6) as "a beautiful job."

Mr Brock is vice-chairman of the society and his brother Stanley is the treasurer.

ME DIARY

December 5 Eltham and District LS, "My 5 in. gauge Adams loco," A. Brock, Beehive Hotel, 8 p.m.
Huddersfield SME, "Philosophy of a Railway Enthusiast," W. Stocks, 7.30 p.m.

December 6 Thames Shiplovers club night, Oddi's Restaurant, Coptic Street, London, 7 p.m.
Rochdale SMEE "Boiler Making," J. Clegg, Lea Hall, 7.30 p.m.
Malden SME bits and pieces.

December 7 Gauge 1 MRA annual meeting, MRC, Hammersmith, London.
REC. Christmas film.
Bristol SMEE annual meeting, Folk House, 7.30 p.m.
SMEE special disposal sale, H.Q., 28 Wanless Road, London, SE24, 2.30 p.m.

December 8 IRCMS at Kingsley Hotel, London.

December 9 Institution of Engineering Designers, "Doxford Marine Diesel Engine," J. A. Hardy, Northern Architectural Association, Newcastle upon Tyne, 7.15 p.m.

December 11 Birmingham SME, "Genevieve," Crown Hotel.
Merseyside MRS, film show, Bob Hunter, Grenville Cafe, Tithebarn Street, Liverpool.

December 12 Hull SME, Best Model of the Year Exhibition (entries, please).
Huddersfield SME, annual dinner, Heywood's Cafe, Market Street, Huddersfield, 7.30 p.m.

December 13 Malden SME, rummage sale.
Warrington MES, "Extrusion of Non-ferrous Metals," illustrated talk.
Thames Shiplovers, "The United States Coast Guard," Capt. Donald T. Adams, USCG.

December 14 Glasgow SME, film show, R. Kerr of Kirkintilloch SMC.
Railway Enthusiasts' Club, colour-slide show, R. C. Riley.
SMEE annual meeting, 14 Rochester Row, Westminster, 2.30 p.m.

December 17 Hastings and District MES, Surprise Night (anything can happen).

December 18 Bristol SMEE, film show in light vein, Folk House, 7.30 p.m.
Leicester SME, annual meeting.

December 20 Malden SME, "Model Loco Building: Choice and Cost."
Birmingham Ship Model Society, "Ship Lines and Plans for Modellers," A. E. Field.

200 × ⅝" Bore Roller Bearings, worth 15/- each, clear 4/6 each.

200 H.S. Reamers with No. 1 M.T. shank, 1/8" 6/-, 7/32" 6/-, 19/64" 6/-, 5/16" 6/6, 21/64" 6/6, 3/8" 7/6, 9/16" 8/6 each.

300 Lengths Precision Ground Silver Steel, 36" long, 5/16" dia., 4/-, 9/16" dia., 10/-, 5/8" dia., 12/6, per 3' length.

3,000 High Speed Routing Cutters, straight shank, two lip, as used for cutting slots in wood, sizes 3/8", clear 4/- each.

100 doz. 6" Three Square Saw Files, 10/6 per doz.

200 H.S. Side and Face Cutters, 4" dia. 5/8" thick, 1 1/4" hole, left and right hand side teeth, a gift, 35/- pair. Worth £6 10s. 0d.

30 Hand Reamers, 27/32" dia., 6/- each.

20 H.S. Slitting Saws, 12" dia., 3/32" thick, 1 1/4" hole, £2 each; 9" dia., 5/32" thick, 35/- each.

200 H.S. Twist Drills, 9/32" dia., No. 1 M.T., 2/9 each.

10,000 H.S. Super Quality Tool Bits, 1/4" square, 2 1/2" long, 15/- doz. 5/16" square, 3" long, 20/- doz. 3/8" square, 3" long, 25/- doz. 7/16" square, 3 1/2" long, 30/- doz. Ground finish.

5,000 Carb. Grinding Wheels, medium fine grit suitable for tool grinding. 1/2" or 3/4" thick, 6 1/2" dia., 3/4" hole, 4/9 each, any thickness. Also dish type grinding wheels, medium grit, 5" dia., 1/2" hole, 4/9 each.

10,000 H.S. Fluting Cutters, 1 1/4" dia., 5/8" hole as used for fluting taps or oil grooves, etc. 3/32" to 7/32" thick, actual value in the region 15/- each. Very good bargain, 3 ass. 6/6.

300 only 3"-3 1/2" dia., 1 1/4" hole, H.S. side and face and plain milling cutters, six, assorted, 50/-.

5,000 High Speed Slitting Saws and Slotting Cutters, 2 1/4" dia., 5/8" bore, 0.045", 0.051", 0.057", 0.064" thick, 3/9 each. 2 3/4" dia., 1" bore, 0.036", 0.048", 0.051", 0.056", 0.064", 0.072", 0.080" thick, 3/9 each. 3" dia., 1" bore, 3/64" 5/64" thick, 6/- each. 3 1/2" dia., 1" bore, 1/32", 3/64", 9/64", 5/32", 11/64" thick, 7/6 each. 4" dia., 1" bore, 3/64", 5/64", 7/64", 7/32" thick, 8/6 each. 5" dia., 1" bore, 5/64" thick, 12/6 each. 3/16" thick, 12/6.

500 Whitworth Screwing Tackle Sets with bright polished steel die-stock, dies 2 1/4" dia., cutting 9/16" 5/8", 3/4", 7/8", 1" Whit., 50/- per set. Also B.S.F. ditto, 50/- per set. Only a third of real value.

1,000 High Speed Side and Face Cutters, 2 1/2" dia., 1" hole, 1/4", 3/8", 1/2" thick, 15/- each. 3" dia., 1" hole, 1/2", 5/8" thick, 20/- each. 3 1/2" dia., 1" hole, 3/8", 3/4" thick, 25/- each. 4" dia., 1" hole, 7/8", 1" thick, £2 each. 5" dia., 1 1/4" hole, 1/2', 3/4" thick, 50/- each.

1,000 H.S. Long Straight Shank Twist Drills approx. 1/16" and 3/32" dia. both 4 3/4" long, 2/6 pair. Approx. 3/16" and 3/8" dia., 6" and 7" long, 5/- the two. 9/64" dia., 11" long, 3/6 each. Approx. 13/64" dia., 10" long, 4/6 each. 19/64" dia., 12" long, 7/6 each.

200 H.S. Spot Facing Cutters 1 1/4" dia., 1/4" dia. detachable pilot, No. 2 M.T. shank. An essential tool for facing bolt holes on castings. Worth 45/-. Gift 12/6 each.

1,000 H.S. Inserted Blades Expanding Reamers, 21/32"-23/32", 16/-; 11/16"-3/4", 17/6; 27/32"-15/16", 18/6; 7/8"-31/32", 18/6; 15/16"-1 1/16", 20/-; 1 1/16"-1 3/16", 27/6.

500 Sets Hex. Die Nuts. Sizes 1/4", 5/16", 3/8", 7/16" and 1/2" Whit, B.S.F., American Car thread or 26 brass thread. These sets are in a neat case. Present day value over 30/- per set, to clear 15/- per set any thread. Two sets 28/6, four sets 55/-. Also 5/8" and 3/4" in Whit. and B.S.F. only, 5/8", 5/- each; 3/4", 6/- each, 10/- per pair.

All items brand new. £1 orders post paid, except overseas.

1,000 H.S. Morse Taper Shank End Mills. No. 1 shank 1/4" 5/-, 3/8" 6/-, 1/2" 6/6, also No. 2 shank, 9/16", 10/-, 5/8" 11/-, 3/4" 12/-, 7/8" 12/-, 1" 15/-. Also straight shank H.S. 5/16" 3/6, 3/8" 4/-, 1/2" 5/-, 7/8" 10/-.

Special Clearance, H.S. taper pin reamers, sizes 4, 5, 6, 7, 15/- the lot, worth £6.

2,000 Small H.S. Twist Drills, approx. 1/32"-3/32", 4/- doz. Approx. 1/16"-1/4", 7/6 per doz. Approx. 9/32"-15/32", six for 10/-.

3,000 Circular Spit Dies 1" dia. cutting 1/4", 5/16", 3/8", 7/16", 1/8" Whit., B.S.F., also brass thread, 26 thread all sizes and American N.F. 12/- per set of 5 sizes, 2 sets 22/6, 4 sets 42/6. Taps to suit 12/6 per set, either taper or second or plug. 1" dia. stocks 6/- each.

1,000 Hand Reamers, 5/16", 3/6 each, 5/8", 4/9 each.

1,000 High Speed Parting Off Tool Blades, Eclipse brand 11/16" × 3/32" × 6" long, 5/- each.

7,000 Pratt & Whitney, circular split dies, superior quality precision ground cutting edges, 13/16" dia. suitable for machine or hand use. Sizes: 2, 4, 5, 6, B.A., 8/6 per set, 13/16" die stock, 3/6 each.

5,000 Ball Races, 1/8" bore, 3/8" o.d., 1/8" thick, 4/- pair; 1/4" bore, 3/4" o.d., 7/32" thick, 4/- pair; 6 mm. bore, 19 mm. o.d., 6 mm. thick, 4/- pair; 9 mm. bore, 26 mm. o.d., 8 mm. thick, 4/- pair; 3/8" bore, 7/8" o.d., 7/32" thick, 5/- pair, 3/16" bore, 1/2" o.d., 5/32" thick, 4/- pair

2,000 Files 4"-6", good assortment, 10/6 doz., also toolmakers' needle files ass., 12/6 doz.

Metal Marking Punches sizes 3/32", 1/8" and 1/4", figures, 8/6 per set, letters, 25/- per set, any size. 1/2" figures, 15/- set.

2,000 Straight Shank End Mills, size 1/8", 5/32", 3/16", 7/32", 1/4", 5/16", list price 30/- set, 15/- set, also 3/8", 7/16", 1/2" ditto, 12/6 set.

500 H.S. 90° Countersinks, body 1/2" dia. Gift 5/- each.

1,000 Bevelled Wood Chisels, handled, 1/4", 5/16", 3/8", 1/2", 5/8", 3/4", 7/8", 1". Actual value 37/6. Gift 25/- set.

200 Cast Steel Circular Saws for Wood, 4" dia., 6/- each; 6", 10/-; 8", 13/6; 10", 18/-; 12", 24/-; 14", 32/-; 16", 40/-.

1,000 Semi High Speed Centre Drills, Slocombe brand 5/16" body dia., 3/32" point, 1/6 each. 16/6 per doz.

20,000 Small High Speed Milling Cutters, various shapes and styles. We want to clear these quickly, 6 assorted, 10/-.

60 Angle Cutters as used for cutting teeth in milling cutters, etc. 3" dia., 1/2" thick, 1 1/4" hole. These are slightly damaged having one tooth with a small chip but are really quite serviceable. Good bargain 10/- each.

80 only 3/8" radius cutters, these cut half 3/8" circle, 2 1/2" dia., worth £3 10s. each, very good stock bargain. Clear 7/6 each.

250 H.S. M.T.S. Twist Drills, 29.5 mm. approx. 1 5/32", 10/- each. 31.5 mm. approx. 1 1/4", 15/- each. 34 mm. approx. 1 11/32", 17/6 each. 40 mm. approx. 1 9/16", 30/- each. 15/16", 7/6 each. 61/64", 8/6 each.

30 Only H.S. Slab Mills 4" dia., 3" wide, 1" or 1 1/4" hole, spiral teeth, 45/- each.

600 H.S. Thin Type Side and Face Cutters, 5", 6", 7", 8" dia., 3/32", 1/8", 5/32", 3/16", 7/32", 1/4" thick, 1 1/4" hole, 5" dia., 25/-, 6" dia., 30/-, 7" dia., 35/-, 8" dia., 40/- each. Any thickness, when ordering please give alternative thickness.

30 H.S. Inserted Blade Milling Cutters, Galtona type, 5" dia., 1/2" thick, 1 1/4" hole, 35/- each.

500 H.S. Gear Cutters, 2 1/4" dia., 1" hole, 26 d.p. Nos. 1 and 6; 22 d.p. No. 7. Clear 12/6 each.

70 Only Nos. 9 and 10 B.A. Dies, best American make, 3/6 each.

J. BURKE, 192 Baslow Road, Totley, Sheffield

Inspection Only at Rear 36 Fitzwilliam St., Sheffield

Model Engineer

Classified Advertisements together with remittance should be sent to Model Engineer, 19/20, Noel Street, London, W.1, by latest Thursday morning prior to date of publication. Advertisements will be accepted from recognised sources by telephone. GERRARD 8811. Ex. 4

CLASSIFIED ADVERTISEMENTS

★ **Private: 3d. per word. Trade: 6d. per word. Minimum 12 words. Use of box 1s. 0d. extra.**

★ **Rates for displayed advertising in this section. Trade 35s., Staff 45s., per single column inch. (Column width 1⅞ in.)**

The Advertisement Manager reserves the right to refuse or suspend advertisements without giving any reason. Every care is taken to avoid mistakes, but the publishers cannot be held liable in any way for printing errors or omissions. Receipt of "copy" for publication implies acceptance of these conditions by the advertiser. Whilst every care is taken to exclude advertisements from doubtful sources, no responsibility can be accepted by the publishers for the bona fides of advertisers.

WORKSHOP EQUIPMENT

Buck & Ryan for Lathes and Workshop Accessories, drilling machines, grinders, electric tools, surface plates, etc.—310-312, Euston Road, London, N.W.1. Phone: Euston 4661.

THE PEOPLES ARC-WELDER

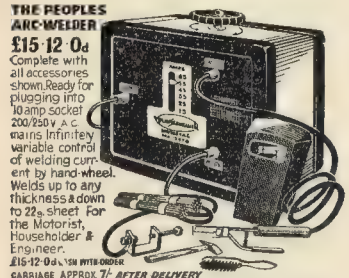
£15·12·0d

Complete with all accessories shown. Ready for plugging into 10 amp socket 200/250 v. A.C. mains. Infinitely variable control of welding current by hand-wheel. Welds up to any thickness & down to 22 s.w.g. sheet. For the Motorist, Householder & Engineer.

£15·12·0d CASH WITH ORDER

CARRIAGE APPROX. 7/- AFTER DELIVERY

Uses Mg. & Mg. Standard Flux Coated Electrodes. One bundle of each supplied with Welder. Extra Electrodes 7/- PER BUNDLE PLUS CARRIAGE



"POP" RIVET GUNS (Lazy Tongs)

For motor body, sheet metal and fabrication work. With universal collet to take all sizes of rivets. **£4.11.0.**

"POP" RIVETS

⅛", 5/32" and 3/16", **10/-** per 250, **20/-** per 1,000 of one and the same size. Mixed "Pop" Rivets **13/-** per 500, **19/-** per 1,000. Send stamp for leaflet.

NEST OF DRAWERS

Overall size 7" wide × 5" deep × 11" high. 12 drawers, each measuring 3" wide × 4½" deep × 1½" high. Useful storage for the engineer, motorist and householder for nuts, bolts and small components. Green enamelled. **£1.** P. & P. 3/-

FLEXIBLE DRIVES

4' 6" long with ¼" drill chuck. For drilling, polishing and light grinding. Runs in both directions. Can be used with Wolf and other hand drills. **45/-** post paid.

HARMSWORTH, TOWNLEY & CO.
Watt House, Jordan Street
MANCHESTER 15

CHARLES PORTASS & SON
Buttermere Works, Sheffield 8

Lathes Chucks Counter-Shaft
Motors Tools

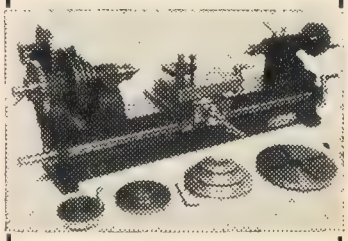
Wimet Tipped Lathe Tools in ¼", 5/16" and ⅜" square, sets of 12, £2 15s. ½" square, £3 5s., cash or c.o.d. New ML7 and Super 7 lathes. Your old lathes taken in part exchange. Send details of what you wish to turn in. Used lathe list, 1s.—CORBETT'S (LATHES), Stanton Hill, Sutton-in-Ashfield.

New Tool Bargains. Hand expanding reamers, ⅛" to 9/32", 5/16" to 11/32", 11/32" to ⅜", 15s. the three. 17/32" to 19/32", 7s. 6d. each. 1 17/32", 1 21/32", 18s. 6d. each. H.S., G.T., B.S.F. taps one each size, 5/32", 7/32", ¼", 9/32", 5/16", ⅜", 7/16", ½", 9/16", ⅝", 11/16", ¾", 13/16", 18s. 6d. the lot. H.S., M.T.S. reamers, ⅛", 7/32", ¼", 9/32", 12s. 6d. the four. Ditto, 5/16", ⅜", 7/16", 15/32", 15s. the four. 17/32", 19/32", ⅝", 21/32", 18s. 6d. the four. ¾", 25/32", 7/8", 29/32", 25s. the four. H.S. hand par. reamers, ⅛", 19/32", 5/16", 15/32", 7/16", ⅜", 11/32", 18s. 6d. the seven. Super set Little Giant, U.S.A. make, s.a.e. (or unified). Stocks and dies in collet guides, ¼", 5/16", ⅜", 7/16", ½"; the dies can be taken out and re-sharpened, the complete set, 27s. 6d. Set of B.S.F. stocks and dies (dies 1 5/16" o.d.), ¼", 5/16", ⅜", 7/16", ½" with one tap each size, 27s. 6d. complete. H.S. radius corner rounding milling cutters, all 1" holes, 9/32", 5/16", 11/32", ⅜", 7/16", 15/32" radius, 10s. each. listed £2 10s. upwards. Harrison 5", 3-point lathe steady, three gunmetal pads, swivel opening, £1 each, listed £6. Sets of 60 high speed twist drills 1-60, £2 5s. 26 ditto, A-Z, £2 12s. 6d. 29 ditto, 1/16" to ½" × 1/64", £3 5s. 10 ditto, 1/16" to ½", 10s. All with attractive Picador or B.D.S. stands complete. 63/64" H.S., M.T.S. twist drill, 8s. 6d. 53/64" ditto, 6s., 10 assorted, ditto to 63/64", 25s. 10" Crown 4-jaw independent chucks with revs. jaws, key and fixing screws, £6. Postage extra please at the prices.—ATTFIELD, 221, Green Lane, New Eltham, London, S.E.9.

★ **SWISS MUSICAL MOVEMENTS!** ★
The Famous **"GUEISSAZ"**
The only movement with a 12 Months' Unconditional Guarantee
For Cig. Boxes etc. 18/-. Long Playing Tunes from 28/-. *Delivery by return.*
Beautifully Illustrated Catalogue 1/- refunded on 1st order.
Send S.A.E. for free tune list.
M. MOSS & CO.
Woodlands Parade, Feltham Hill Road, Ashford, Middx
Tel: ASHFORD (Middlesex) 4465/3382

Wanted. Lathe, old, broken or incomplete, must be cheap.—1, Kingswood Way, Wallington.

For all "EW" Lathe Requirements Consult: WANSTEAD SUPPLY Co



The E.W. 2½" × 10" Convertible Lathe

Is so simple. You can buy the basic model and by the addition of inexpensive conversion units possess a machine tool unrivalled in its class. Special features:—* Plain or gap bed * Micrometer feedscrew collars * Ground bed and slides * Instrument finish * Powerful headstock drive *. Exceptional accuracy. And the price **£17.0.0** for the basic model "A" Lathe.

Send S.A.E. for comprehensive brochure. No fuss, no interest, credit terms. Quickest **delivery.** Best service.

Full range of accessories from stock.

3/8 in. HIGH-SPEED SENSITIVE POWER BENCH DRILLING MACHINE

Price **£6/10/-** net, or **10/- Deposit** and six monthly payments of **£1,** carriage and packing extra.

(S.A.E.) for specification and descriptive pamphlet.

WANSTEAD SUPPLY CO.
30, The Broadway, Woodford Green, ESSEX

Delivery from Stock. Zyto 3⅞" lathes, cash £33 or 1st payment of £6 12s. and 8 monthly payments of £3 14s. 4d. Myford ML7, £55 cash or 1st payment of £11 and 8 monthly payments of £6 3s. 9d. Myford Super 7, £82 cash or 1st payment of £16 8s. and 8 monthly payments of £9 4s. 7d. If you are in a hurry for any kind of machinery or tools, please write to—ROSS & ALEXANDER (LONDON) LTD., 165/7, Bishop's Gate, London, E.C.2.

ML7 or Super with cabinet stand, tools and accessories, suitable 240/1/50. Write—SYRETT, Dene House, Woolbeding, Midhurst, Sussex.

Immediate Delivery from Stock, Myford "ML7" and "Super 7" lathes, Super Adept lathes, bench planers, shapers, electric motors, small tools.—F. W. KUBACH, 12, Sylvan Road, London, S.E.19. LIV 3311-12.

Wanted. Ornamental turning lathe in good condition. State price and where it can be inspected.—Box No. 8735, MODEL ENGINEER Offices.

Mail Order. New bargains, 1s. extra post under £1. Dies $\frac{13}{16}$" 40 t.p.i., 5/32", $\frac{1}{16}$", 7/32", $\frac{1}{4}$", 3s. 4d. each. Taps 40 t.p.i., 5/32", $\frac{3}{16}$", 7/32", $\frac{1}{4}$", 2s. each. Hand bench drilling machine, $\frac{1}{2}$" chuck 2-speeds, £5 10s. Burnerd independent chucks 4", 72s., 4½", 75s., 6", £6 4s. 6d. Self centring 4", £9 0s. 3d. Machine vices, 18s. 6d. Precision drill chucks $\frac{1}{2}$", No. 1 M.T., 43s. No. 2, 44s. Wood chisels set $\frac{1}{4}$", $\frac{3}{8}$", $\frac{1}{2}$", $\frac{5}{8}$", 1", 16s. Expanding wood bits, $\frac{1}{2}$"-1$\frac{1}{8}$", 14s., $\frac{7}{8}$"-3", 19s. Stillson wrenches 6", 4s. 6d., 8", 6s., 10", 7s. 6d. Hand drills $\frac{1}{4}$", 10s. Breast $\frac{1}{4}$", 27s. 6d. Drill chucks $\frac{3}{8}$" No. 1 or No. 2 M.T., 11s. 6d. Superior, 18s. 3d. Lathe centres No. 1 M.T., 4s. 7d., No. 2 M.T., 6s. 6d., No. 3 M.T., 8s. 6d. H.S. tool bits, $\frac{1}{4}$", 1s. 6d., $\frac{5}{16}$", 1s. 11d., $\frac{3}{8}$", 2s. 3d. Sets H.S. drills No. 1-60, 50s. H.S. drills 29 different $\frac{1}{16}$"-$\frac{1}{2}$", 70s. H.S. A-Z, 57s. Stands with each set. Micrometers, 1", 10s. Drill grinding jig to $\frac{1}{2}$", 37s.—S. GRIMSHAW, 7, Hall Street, Manchester 18. Warehouse, Gorton Lane.

"E.W." 2½" × 10" Convertible Lathe. We can now arrange delivery of this much sought-after lathe. All accessories from stock. S.A.E. lists and illustrated leaflet.—WANSTEAD SUPPLY CO., 39, The Broadway Woodford Green, Essex.

Ward Turret Lathe, £25. One 3 h.p. motor, one 1 h.p., two ½ h.p., three starters. All 400-440 volt, 3-phase, £15 the lot.—3, Ferry Road West, Scunthorpe, Lincs.

Exchange. 1938 B.S.A. Scout four-wheel, 10 h.p., two seat sports car, approximate value £55, for 3½" or larger B.G.S.C. lathe, Myford preferred but anything considered. Straight swop or lathe with equipment up to £55. Wolverhampton area. Phone Albrighton 591, or write—Box No. 873 MODEL ENGINEER Offices.

M.E. giving up hobby. Large diameter brass offcuts for sale.—Box No. 8734, MODEL ENGINEER Offices.

Exchange. 600 c.c. Panther motorcycle, £30 overhaul 1,700 miles ago, for motorised ½" bench drill or power shaper in good condition. S.A.E. for details. All letters answered.—34, Strode Road, Stamshaw, Portsmouth.

Jig-Saw, heavy floor model, complete with ½ h.p., 230-1-50 motor, £12 10s. Adept hand shaper, £5 10s. 1/3 h.p. motor, 230-1-50, £3 10s. Buyer collects.—HEANE, 1, Stonard's Brow, Shamley Green, Guildford.

For Sale. 2½" backgeared precision lathe, with countershaft, chucks and tools, £11.—Box No. 8738, MODEL ENGINEER Offices.

Lathes. Myford treadle, can be motorised, £35. Drummond treadle can be motorised, £20. Both with accessories. Denham "Halifax," 4½", 26" V-bed all geared head auto feeds.—LIGHT PLANE MAINTENANCE, Elstree Aerodrome, Herts. Elstree 3586.

Wanted. Modern 4-5" Lathe with equipment, Boxford, South Bend, LeBlond or similar preferably with Norton gearbox. A.C., 210 volt, reasonable.—STILES, 153, Billing Road, Northampton.

Use Your Vice to press neat round holes with patented punch, no setting, always ready for use. Reaches to centre of 10" circle, $\frac{1}{8}$" to $\frac{3}{8}$", £5. Six sizes or £1 each.—BCM/CATT, London, W.C.1.

Sale. 5-pint blowlamp, new condition, £2. Also some castings $\frac{3}{4}$" scale G.N.R. "Atlantic."—26, Thorburn Road, Edinburgh, 13.

18" Metal Planer, £22. Motorised drill, $\frac{1}{2}$" capacity, £14.—HARGREAVES, 26, Brownlow Street, Clitheroe.

Winfield 4½" × 18" B.G.S.C. lathe, countershaft, 3-jaw, 4-jaw chucks and standard equipment, £30.—GERRARD, 68, Marshalls Cross Road, St. Helens, Lancs.

MODELS AND FITTINGS

Curves, straights, halves, quarters, 6d. each. Points, 10s. Crossing, 5s. Buffers, 1s. 3d. Rotary transformer, 230-20 volts, d.c. to a.c., £1.—GOODYEAR, Brook Cottage, Blackmore End, Braintree.

4' Model Tug Stuart Double 10, feed pump, lubricator, excellent condition. What offers?—F. LOVE, West Runton, Cromer.

Wanted. All types British naval intelligence ship ident. models in hardwood, scale 1"-100', any navy or merchant marine. German Viking metal models, scale 1 : 1,250, single pieces or collections. The following editions only: Jane's "All the World's Fighting Ships," 1898; Jane's "All the World's Aircraft," 1909 or 1918; Weyer's "Taschenbuch der Kreigsflotten," 1922; Shizuo Fukui's "Japanese Naval Vessels at the End of the War," publ. 1947. Write and describe. For sale or trade, duplicate models, 1"-100' or 1 : 1,250 scales, all types.—DON SCHROTH, 321, N. Monroe, Hinsdale, Illinois, U.S.A.

Sale. "Maisie," 3½" gauge, needs painting otherwise perfect. Nearest £30.—M. HEAD, 8, Second Ave., Teignmouth, Devon.

Steam Plant, h.p. 150, vertical compound, reversing engine, 1½" × 1¾" × 1¼" stroke. All fittings, pump, water tank, etc. Photograph, s.a.e. please. Cheap £30.—Box No. 8736, MODEL ENGINEER Offices.

Aerograph 14" × 7" air tank, 80 lb. gauge, all fittings, pipes, valves, regulator, £4 10s.—HIGGINBOTHAM, 333, Brinnington Road, Stockport.

ELECTRICAL

A.C. Motors Self Start, induction 200/250 volts, 50 cycles, 1 phase, 1,425 r.p.m., ¼ h.p., £4 2s. 6d., 1/3 h.p., £4 19s. 6d., ½ h.p., £6 15s. Perfect and guaranteed. Carriage extra.—JOHNSON ENGINEERING COMPANY, 319, Kennington Road, S.E.11. Reliance 1412/3.

Electric Muffles, steel jacketed, 5" × 3" × 1½", 1 kw., 2,000 deg. F., 35s. 6d., p.p. 4s.—PAYTON, 57, New Road, Rubery, Birmingham.

SITUATIONS

Model Maker. May and Baker Ltd., Dagenham, Essex, require a man, aged 25-35, to construct models of chemical plant and pipework for design purposes. Applicants should have a keen interest in model making and skill in the use of tools. Ability to read engineering drawings is essential and engineering drawing experience desirable. There is a pension fund and life assurance scheme in operation. Apply initially in writing to the—PERSONNEL OFFICER, quoting Reference No. 185.

GENERAL

Learn It As You Do It—We provide practical equipment combined with instruction in radio, television, electricity, mechanics, chemistry, photography, etc. Write for full details to—E.M.I. INSTITUTES, Dept. ME47, London, W.4.

Unowot Whiston's Sell. S.A.E. catalogue.—K. R. WHISTON (Dept. M.E.S.), New Mills, Stockport.

Air Compressors, tanks and accessories at far below list, from £5 17s. 6d., TV and lighting generator from £15.—TEDDINGTON ENGINEERING CO. LTD., 29-31, High Street, Teddington, Middx. Tel.: Kingston 1193.

Spraying Handbook, 3s. 10d., post free. Paints, cellulose and allied spraying sundries. Catalogue, 3d.—LEONARD BROOKS, 25, Oak Road, Harold Wood, Romford.

3,000' new ⅝" standard aluminium alloy rail in 12' lengths, £112. Buyer collects.—Box No. 8718, MODEL ENGINEER Offices.

Build Your Own Refrigerator. Everything to make built-in or cabinet refrigerator. S.A.E. for sealed unit list and schematic diagram or 1s. (refundable) for 32 page catalogue including details of free 4 cu. ft. cabinet diagram offer. Hire purchase available.—WHEELHOUSE, 13, Bell Road, Hounslow. 'Phone: HOU 3501.

Guaranteed! Easy Home Constructed Refrigeration. Genuine domestic components. Not secondhand ice cream scrap. Modern hermetic G.E.C. units, gas, electric and oil silent unit. Everything for refrigeration. Complete specialists.—Send s.a.e. for free illustrated "Sealed system" leaflet or 1s. for complete catalogue (refunded with first order).—BRAID BROS., 50, Birchwood Avenue, Hackbridge, Surrey. Phone: Wallington 9309.

Aqualung and compressor equipment.—PRYCE, 157, Malden Road, Cheam.

Illustrated Catalogue No. 13. Containing over 450 items of Government surplus and model radio control equipment, 2s. 2d. Refunded on purchase of goods, 2s. 6d. overseas seamail.—ARTHUR SALLIS RADIO CONTROL LTD., Department M.E., 93, North Road, Brighton.

Young & Son. Material and tool dealers, watch, clock and jewellery repairers.—33, London Road, Chippenham, Wilts.

Build Your Own Car Heater. Complete set of new components, £3, carr., 3s. 6d. Radiators, 12s., post 2s. 6d. S.A.E. for list.—WHEELHOUSE, 13, Bell Road, Hounslow. HOU 3501.

Watch, Clock and Instrument tweezers, pliers, eyeglasses, broaches, pivot-steel files, screwdrivers, brushes, oil lathes, cleaning machines, staking and jewelling outfits, rolling mills, rouge, etc. Illustrated catalogue and price list, 5s. 6d. Easy payment terms available.—JOHN MORRIS (CLERKENWELL) LTD., 64, Clerkenwell Road, E.C.1.

Compressors for Sale. Twin piston with tank, 2½ cu. ft. per min., £4. Single cyl., £2. All types motors. S.A.E. for list.—WHEELHOUSE, 13, Bell Road, Hounslow. Phone: HOU 3501.

Light Precision Turning, Fitting and Assembly Work Wanted. Production, experimental or prototype and complete mechanisms. Prompt delivery, moderate charges.—CANONBURY ENGINEERING CO., 283, Essex Road, London, N.1. Can 6256.

Motors, 1/20 h.p. silent fan motors, 15s., post free. 1/6 h.p. new motors, £4 10s. C.F. Clutches heavy duty transmit to ½ h.p., £1 carr., 2s.—WHEELHOUSE, 13, Bell Road, Hounslow. HOU 3501.

Heavy Duty Transformers, 500 watts, 200/250 to 110 volts, £2. 200/250 to 24 volts, new, 15s., 12 volt rectifiers, 10s.—WHEELHOUSE, 13, Bell Road, Hounslow. HOU 3501.

Steam Cars, boats and small stationary power units are described in "Light Steam Power." Your copy and comprehensive illustrated lists of drawings; including Light Steam Car Power Unit, and castings for 3s. 8d.—LIGHT STEAM POWER, Kirk Michael, Isle of Man, U.K.

Modern Detached House, two large reception, 3/4 bedrooms, fitted kitchen, usual offices, concrete garage 22' × 11', concrete workshop 24' × 11'. All in excellent order, in 1/5 acre. On bus routes and very convenient for City. £3,750 asked, which includes many extras. View by appointment. Letters please to—OWNER OCCUPIER, 39, Squirrels Heath Road, Harold Wood, Essex.

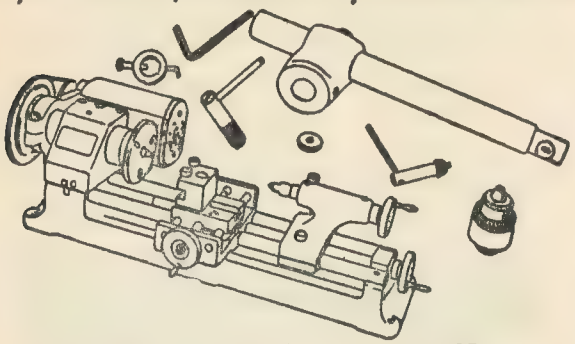
Photo Enlarger castings and bellows, for 35 mm., 2¼" × 2¼", 2¼" × 3¼", 35s. per set. S.A.E. for details.—V. J. COTTLE, 84A, Chaplin Road, Easton, Bristol, 5.

Wanted. Records of Churchill's wartime speeches, good condition. Write—SUNTER, 1440, 9th Avenue, East Calgary, Alberta, Canada.

Jig and Tool Designs, drawings of any description relating to engineering erected to customers' requirements, or your basic sketches improved and completed in design.—W. ARNOLD, Tool Design Specialist, 7, Stoke Road, Gosport, Hants. Gosport 89381.

The EMCO-UNIMAT

A portable, precision, power-bench



HEIGHT of CENTRES 1⅜″
BETWEEN CENTRES 6⅝″
OVERALL LENGTH 16″
HOLLOW SPINDLE ¼″

FOR
TURNING
DRILLING
MILLING
GRINDING
SAWING etc.

As illustrated with Motor in wooden case **£27 . 17 . 6** EXTENDED CREDIT AVAILABLE

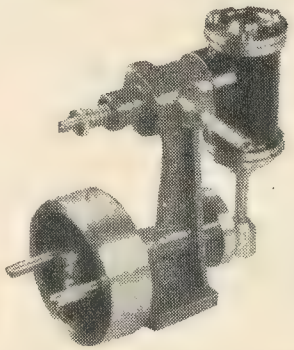
LONDON STOCK

BUCK & RYAN LTD

310-312, EUSTON ROAD, LONDON, N.W.1

FULL RANGE OF ADDITIONAL ATTACHMENTS AVAILABLE

Write for illustrated leaflet



The sign of quality

No. 605 Marine Boiler to suit engine No. 628 polished copper, 5 in. long price 38/-. 6 in. long, price, 48/10. 3 fittings for above boilers, 13/4 per set. All tax and post paid.

No. 628. Best Double Action Oscillating Marine Engine, $\frac{7}{16}$″ × ½″. Made from solid brass and gunmetal, lipped in screwed top and bottom covers. Price 36/-, tax and post paid.

We regret our fully Illustrated Catalogue is now out of print. Our NEW revised catalogue will be ready early in the New Year, price 3/5, post paid. YOU CAN ORDER NOW.

Well over 1,000 size fittings are made in our works, and whether you require fittings for Yachts, Sailing Ships, Launch, Liner, Naval or Marine, our excellent productions are produced to give you entire satisfaction at a reasonable price. If you have difficulty in obtaining our products, send your order to our works. We regret NO ENQUIRIES can be answered unless a stamp is enclosed for return postage.

THE WEB MODEL FITTING CO.

204, HIGH ROAD, WOOD GREEN, LONDON, N.22, ENGLAND

BUILD YOUR OWN
REFRIGERATOR
or Rejuvenate your old one

Everything for making Built-in or Cabinet Refrigerator at reasonable prices

New Guaranteed Sealed and Absorption Units in stock. Hire purchase available

Send S.A.E. for Sealed Unit List and Schematic Diagram or 1/- (*refundable with first order*) for 32 Page Catalogue of all Components to Build Your Own Refrigerator, including details of our Free 4.2 cu. ft. Cabinet Diagram Offer.

CALL, WRITE OR PHONE ANY TIME

WHEELHOUSE

13 Bell Road, Hounslow, Middlesex

Phone: HOUNSLOW 3501

THE WORLD'S GREATEST BOOKSHOP

FOYLES

FOR BOOKS

FAMED CENTRE FOR

Technical Books

WE CAN SUPPLY ALL BOOKS REVIEWED OR ADVERTISED IN "MODEL ENGINEER" AND ALL OTHER PUBLICATIONS

JOIN THE SCIENTIFIC BOOK CLUB!
You buy Books published at 10/6, 12/6, 15/- and more—*for ONLY* 4/-. Write for details.

119-125 CHARING CROSS ROAD, LONDON, W.C.2
GERrard 5660 (20 lines) ***Open 9-6 (including Saturdays)***
Two minutes from Tottenham Court Road Station

Books: the Ideal Gift

THE "M.E." LATHE MANUAL *by Edgar T. Westbury.* The different types of lathe tools are described, and there is much information on the various lathe operations, including turning between centres, chuck and faceplate work, boring and internal turning, screw cutting, &c. The chapter "Miscellaneous Lathe Operations" describes many other jobs which the lathe can do—aided in some cases by the use of a simple attachment or fixture—such as profile, eccentric and spherical turning, relieving, spinning, burnishing and lapping. 165 pages, 96 photographs, 70 diagrams. **12s. 6d.**, post 1s. (U.S.A. and Canada $3.00 post paid.)

MECHANICS IN MINIATURE *by Percival Marshall, C.I.Mech.E.* The story of model engineering, told by the founder of MODEL ENGINEER. A really fascinating narrative, which tells of the interest and virtues of the hobby, how it came into being, and how it has spread to all parts of the world, is a remarkable tribute to the mechanical genius of the British race. Over one hundred splendid photographs of model locomotives, railways, traction engines, steam and petrol engines, ships, speed boats, tools, aeroplanes, buildings, racing cars and every kind of mechanical device in miniature. 192 pages. **10s. 6d.**, post 8d. (U.S.A. and Canada $2.50 post paid.)

CHRONICLES OF A COUNTRY WORKS *by Ronald H. Clark, A.M.I.Mech.E.* The story of "Burrells of Thetford." The growth and development of this world famous family business which was responsible for making the first portable engine (in 1848) and the first heavy duty steam road haulage engine (in 1856). The very fine collection of drawings and plates of traction engines, and the appendix giving details of almost every Burrell engine made, nearly 4,000 of them, make this book unique in its field. 328 pages, 167 plates and figures. **63s.**, post 1s. 6d. (U.S.A. and Canada $12.50, post paid.)

STEAM ENGINE BUILDERS OF LINCOLNSHIRE *by Ronald H. Clark.* This book represents the history of thirty engineering companies in Lincolnshire, recording the vicissitudes of the firms and their founders and describing the characteristics of numerous types of engine, including many unusual designs. A feature of the book is the numerous illustrations, which, where possible, are the original catalogue blocks of reproductions of them. 150 pages, 141 illustrations. **12s. 6d.**, post 1s.2d. (U.S.A. and Canada $3.00, post paid.)

MAINTENANCE AND MANAGEMENT OF SMALL LOCOMOTIVES *by H. E. White.* This book caters for the man who, having built and operated one or more miniature steam locomotives, naturally wishes to keep them in good working order for as long as possible. The information in this book enables him to service his locomotives in such a way as to achieve this purpose and to secure the best performance from his engines when "in steam." 214 pages, 146 line drawings and photographs. **12s. 6d.**, post 1s. (U.S.A. and Canada $3.00, post paid.)

MAISIE *by L.B.S.C.* Most popular of all this author's famous scale locomotives, *Maisie*, easy to build and not too expensive, is a 3½ in. gauge model of the large-boilered Atlantic built for express trains of the old Great Northern. The book gives complete details of step-by-step building in 140 pages. 109 working drawings and 16 photographs. Full size blueprints are available. **12s. 6d.**, post 1s. (U.S.A. and Canada $3.00, post paid.)

THE LIVE STEAM BOOK *by "L.B.S.C."* To use the well-known expressions of the author, this is a collection of illustrated notes from his "words and music," fully describing useful "tried, tested and guaranteed" components and accessories suitable for small steam powered locomotives intended for real work. "L.B.S.C." is a contributor to *Model Engineer* of long standing and it has become generally recognised that, so long as his instructions are carefully followed, success is guaranteed; not one of his miniature locomotive designs has proved a failure. **12s. 6d.**, post 1s. (U.S.A. and Canada $3.00, post paid.)

LOCOMOTIVES WORTH MODELLING *by F. C. Hambleton.* Lavishly illustrated with detailed drawings. Contains chapters on models exhibited in the Paris Exhibition of 1889. Also descriptions of many famous locomotives of the pre-grouping era including the following: The old Midland Railway No. 1447; London and South Western No. 591; London, Chatham & Dover No. 145; the famous Great Northern Number One; the Manchester, Sheffield & Lincolnshire No. 694. The author describes some interesting locomotives built at Crewe and Stafford, also the later Midland Singles and three and four cylinder compounds of the London & North Western. A fascinating book for the railway enthusiast. 176 pages. **10s. 6d.**, post 8d. (U.S.A. and Canada $5.20, post paid.)

SEVENTEENTH CENTURY RIGGING *by R. C. Anderson, Litt.D., F.S.A.* 148 pages; 23 folded sheets of drawings incorporating 282 figures; nine photo plates. Based on the author's previous successful work *The Rigging of Ships in the Days of the Spritsail Topmast*, 1600-1720. This superb work contains a full-size rigging plan of the *St. George* of 1701 drawn by Mr. L. A. Pritchard, together with the author's sketches and notes; also a number of photographs showing details of the rigging. Dr. Anderson is recognised the world over as the leading authority on the rigging of ships of this period and, in his position as President of the Society for Nautical Research and a Trustee of the National Maritime Museum, he has unrivalled opportunities for keeping up with the latest information. **25s.**, post 1s. (U.S.A. and Canada $5.00, post paid.)

MODELLED ARCHITECTURE *by P. R. Wickham.* A really practical work on the subject of architectural modelling. The author begins with notes on suitable scales, advice on tool kits, material to be used, etc., and carries the reader right through all the essential details of this fascinating pastime, including "period" scale modelling, churches, cathedrals, complete layouts and large-scale work. Delightfully illustrated with nearly 200 diagrams, a book to charm and please the enthusiast. 170 pages. **6s.**, post 8d. (U.S.A. and Canada $1.50, post paid.)

SHIP MODELLER'S LOGBOOK *by John N. C. Lewis.* 200 pages. A valuable introduction to lightweight ship modelling written especially for the beginner. The author gives practical building instructions for a series of models. These include a decorative ship model, a decorative half model, a small waterline model, a ship set in a sea, two representative ship models, three built-up models commencing with a very simple subject, and finally a sailing model of a Grand Banks fishing schooner. The book is illustrated with many photographs of the models or the ships described and with fourteen accurate scale plans. In addition, there are over one hundred detailed drawings by the author. The new edition is complete and unabridged, **7s. 6d.**, post 8d. (U.S.A. and Canada $2.00, post paid.)

SHIPBUILDING IN MINIATURE *by Donald McNarry.* 160 pages. 40 illustrations and plates with drawings and photographs by the author. Mr. McNarry has exhibited many of his models at the Model Engineer Exhibition and has won numerous silver and bronze medals. His work embraces models from Tudor times to modern liners of the latest type. He puts his long experience at the disposal of the reader, who is given detailed instruction stage by stage, from the purchase of materials—what to buy and where to buy—to the last finishing touches. **12s. 6d.**, post 1s. (U.S.A. and Canada $3.00, post paid.)

THE TEA CLIPPERS *by D. R. MacGregor.* With a wealth of detail, the design and construction of the famous fast-sailing ships which were built expressly to race tea from China to the London market, are described and superbly illustrated. A number of folding plans, and over 40 reproductions from famous paintings and early photographs are included; 7 plates give lines of 6 particular ships; also spare dimensions and rules for tonnage measurement. Comprehensive index; bibliography. 194 pp. **25s.**, post 1s. (U.S.A. and Canada $5.00, post paid.)

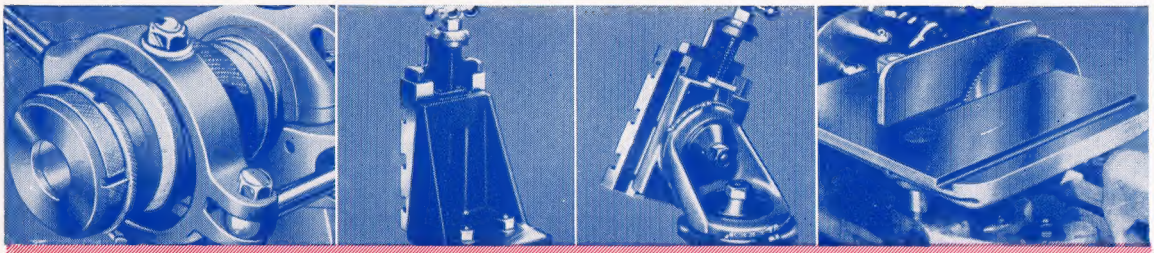
BUILD YOURSELF A MODEL YACHT *by W. J. Daniels and H. B. Tucker.* Here are two designs by men famous in the model yachting world, together with complete working instructions and full-size construction plans for a 30 in. Sharpie and 36 in. restricted yacht—guaranteed to sail! Materials for the Sharpie cost under £3, for the 36 in. under £6. 21 helpful diagrams. 104 pages. Expert advice on sailing of model yachts. **12s. 6d.**, post 1s. (U.S.A. and Canada $3.00, post paid.)

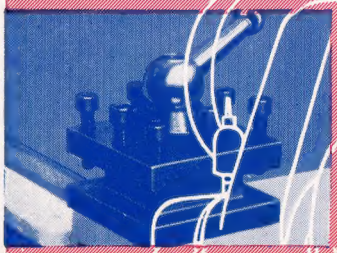
THE FOUR-MASTED BARQUE *by E. Bowness.* The author is well known to readers of MODEL ENGINEER for his articles on ship modelling and maritime topics. In this book the 4-mast barque, as a type, has been most carefully analysed, and the many variations in form and rig are described and illustrated. Practically any known 4-mast barque can be accurately modelled from this recent book. 128 pages, 88 figures, 44 plates, 3 folding plans. **5s. 6d.**, post 8d. (U.S.A. and Canada $2.25, post paid.)

PERCIVAL MARSHALL & Co. Ltd., 19-20 Noel Street, London, W.1

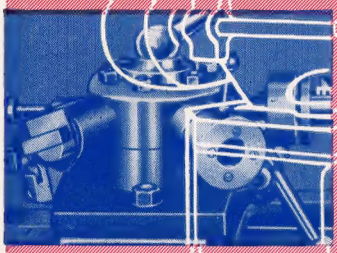
Registered for transmission by Magazine Post to Canada including Newfoundland.
Printed in Great Britain for the Proprietors by Electrical Press Ltd., Cordwallis Works, Maidenhead, Berks, and published by Percival Marshall & Co. Ltd., 19-20, Noel Street, London, W.1.

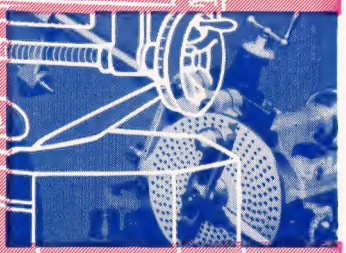
M.E. QUERY COUPON DECEMBER 1957

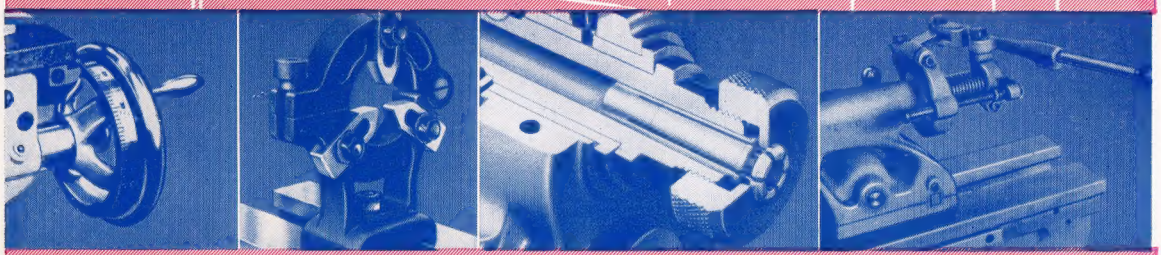




Make it a MYFORD Christmas







ACCESSORIES

The versatility of the Myford Lathe is greatly increased by the large range of Attachments and Accessories, only a few of which are illustrated above. Specially designed and manufactured for fitment to ML7 and Super 7 Lathes, they are rigidly inspected at every stage of production, ensuring unvarying reliability and reflecting the superb workmanship that has gone into their construction. The Myford tradition of quality is held in high regard by Engineers all over the World.

May we take this opportunity of extending the compliments of the Season to our many friends.

MYFORD MACHINE TOOLS

MYFORD ENGINEERING CO. LTD., BEESTON, NOTTINGHAM, ENGLAND

THE IDEAL XMAS GIFT!

BOX-FORD *Little Giant*

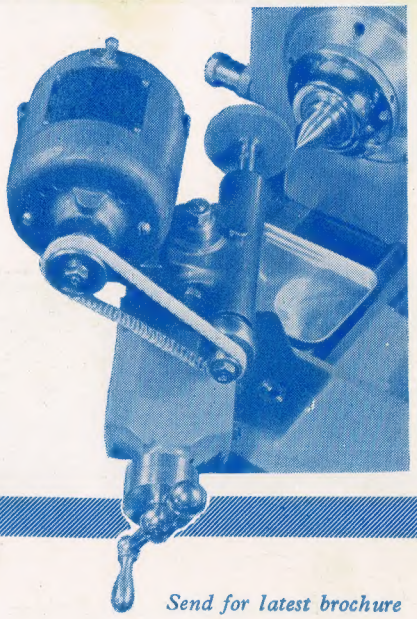
TOOL POST GRINDER

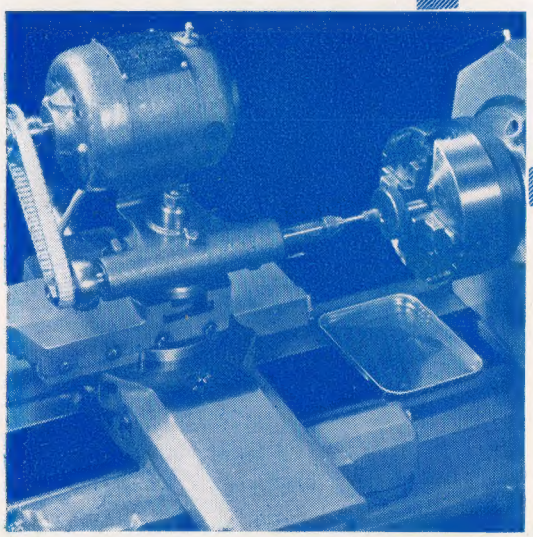
* 1/10th H.P. MOTOR
* QUICKLY FITTED TO TOP SLIDE
* WIDE ANGLE OF MOVEMENT
* EXTERNAL AND INTERNAL GRINDING
* SUPPLIED IN FITTED STORAGE BOX

REDUCED PRICE

£19 15 0

Here is a compact economical unit that provides the high quality ground finish so often required for cylinders, pistons and similar components. It is designed for use on all popular makes of model engineers' lathes.





Send for latest brochure

DENFORDS ENGINEERING CO. LTD.

HECKMONDWIKE - YORKSHIRE - ENGLAND

Telephone: 627-8-9 Telegrams: Harrison, Heckmondwike